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The Green Hydrogen Economy:
Valuation of the Global Hydrogen Electrolyser Manufacturing Market

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Abstract

This study provides a comprehensive analysis of the global green hydrogen electrolyser manufacturing market. Leveraging rigorous market assessments, panel data regressions and DCF valuations, it uncovers growth trajectories, projecting the total sales value of electrolyser systems worldwide to reach $81.1 billion by 2050, powered by unceasing innovation, strategic M&A initiatives, robust liquidity management, and judicious market expansion. Simultaneously, the study emphasizes the long-term investment opportunities presented by these companies. Serving as a strategic guide for investors, managers, and policymakers, it represents an invaluable tool for stakeholders eager not just to contribute to, but also to benefit from the industry's evolution.

Keywords

Green Hydrogen, Electrolyser Manufacturing, Electrolysis Capacities, Growth Drivers, Valuation, Market Analysis, Panel Data, Discounted Cash Flow

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Table of Contents

List of Figures **4**
List of Tables **5**
Introduction **6**
1. Hydrogen Production from Water Electrolysis **9**
2. Global Hydrogen Electrolyser Market **12**
2.1. Green Hydrogen Demand 13
2.2. Required Installed Electrolysis Capacities 15
2.3. Projected Electrolyser Manufacturing Capacities 17
2.4. Electrolyser System Prices 20
2.5. Market Size 21
3. Drivers of Future Company and Industry Growth **23**
3.1. Variables' Selection 24
3.2. Data Pre-Processing Techniques 27
3.3. Model Specification 28
3.4. Pooled OLS Model on GPM 30
3.5. Pooled OLS Model on TOBIN 32
4. Valuation of McPhy Energy SA **34**
4.1. Company Overview and Current Financial Position 35
4.2. Reclassification of Financial Statements 36
4.3. DCF Model and Assumptions 37
4.4. Future Projections and Valuation 41
4.5. Monte Carlo Simulation, Sensitivity, Tornado and Spider Chart Analyses 44
4.6. Investment Recommendation 46
4.7. Comparative Analysis of McPhy's Growth Potential 47
Conclusion **49**
Appendix A: Electrolyser Manufacturers **51**
Appendix B: Green Hydrogen Demand Forecasts **53**
Appendix C: Required Installed Electrolysis Capacities **55**
Appendix D: Planned Expansion Programs of Electrolyser Manufacturers **57**

Appendix E: Electrolyser System Costs by Source 59
Appendix F: Panel Data Regression Models and Diagnostic Tests 63
Appendix G: Descriptive Statistics and Correlation Matrix from Regression Models 69
Appendix H: Stata Do-File 72
Appendix I: McPhy's Valuation Overview 78
Bibliography 101

List of Figures

Figure 1: Water Electrolysis Principle 9
Figure 2: Alkaline Water, Proton Exchange Membrane and Solid Oxide Electrolysers 10
Figure 3: Electrolyser System Structure 11
Figure 4: Green Hydrogen Demand Forecasts 14
Figure 5: Forecasted Installed Electrolysis Capacities in 2030 and 2050 16
Figure 6: Installed Capacities by Forecast and Market Scenarios 19
Figure 7: Forecasted Electrolyser System Costs by Technology 20
Figure 8: Electrolyser Market Size 22
Figure 9: Evolution of EBIT and Total Comprehensive Income 41
Figure 10: Evolution of ROIC and ROE 42
Figure 11: Forecast from Monte Carlo Simulation 44
Figure 12: Tornado Chart Analysis of Fair Share Price 45
Figure 13: Electrolyser CAPEX Evolution by Energy Transitions Commission 59
Figure 14: Electrolyser CAPEX Evolution by Hydrogen Council 59
Figure 15: Electrolyser CAPEX Evolution by IEA 60
Figure 16: Electrolyser CAPEX Evolution by Monitor Deloitte 60
Figure 17: Electrolyser CAPEX Evolution by Nel ASA 61
Figure 18: Electrolyser CAPEX Evolution by Store&Go Project 61
Figure 19: Electrolyser CAPEX Evolution by World Energy Council 62

List of Tables

Table 1: Dependent and Independent Variables 26
Table 2: Final VIFs 28
Table 3: Pooled OLS Model on GPM 30
Table 4: Pooled OLS Model on TOBIN 32
Table 5: McPhy's Cost of Capital 39
Table 6: Valuation Results 43
Table 7: Two-Way Sensitivity Analysis of Fair Share Price 45
Table 8: Sample of Electrolyser Manufacturers 52
Table 9: Summary of Green Hydrogen Demand Forecasts 53
Table 10: Electricity Requirements for Hydrogen Generation 55
Table 11: Required Installed Electrolysis Capacities by 2030 and 2050 55
Table 12: Summary of Future Planned Electrolyser Capacities 58
Table 13: Fixed Effects versus Random Effects Models 67
Table 14: Output of "xtdescribe" 69
Table 15: Output of "xtsummarize" for Dependent Variables 70
Table 16: Output of "xtsummarize" for Independent Variables 70
Table 17: Correlation Matrix 71

Introduction

Climate change represents a complex global issue that has gained increasing attention in recent years due to the urgency of mitigating its effects. In this context, the Paris Agreement, adopted by the international community in Paris during the UN Climate Change Conference (COP21) in 2015, set forth ambitious goals to address the urgent challenge of global warming (United Nations, 2015). To transition towards a sustainable and resilient future, it is fundamental to shift away from the traditional energy system, still primarily reliant on fossil fuels, towards low-carbon alternatives.

Hydrogen, especially low-carbon hydrogen, is one of these promising alternatives. Hydrogen emerges as a versatile and climate-neutral energy carrier with the potential to play a significant role in reducing emissions. By using hydrogen as a direct replacement for fossil fuels in hard-to-abate industries, it can contribute to decarbonizing various sectors in the economy. Additionally, hydrogen can facilitate energy storage and grid balancing, enabling the integration of intermittent renewables into the power grid and helping to balance the supply and demand of energy. Furthermore, hydrogen promotes energy independence and decentralization: it reduces the reliance on imported fossil fuels, favoring energy security and reducing supply disruptions. Overall, the growth of the low-carbon hydrogen industry can contribute to job creation and economic development by stimulating local economies and providing new employment prospects.

Currently, several challenges inhibit the deployment of low-carbon hydrogen on a large scale, including its relatively higher costs, the complexity of its supply chain, and the lack of a suitable infrastructure system. To fully realize hydrogen's potential and overcome the current obstacles, concerted efforts are needed from governments, industry stakeholders and research institutions. Particularly, it is crucial to match hydrogen demand and supply, achievable with the development of efficient technologies. In this context, investments are essential to reduce production costs and

make low-carbon hydrogen a cost-competitive alternative (Ueckerdt et al., 2022). Concurrently, innovative solutions can streamline the supply chain and the transition from production to end use. Therefore, a combination of targeted investments, technological advancements and supportive mechanisms is key to align hydrogen supply with demand, fostering a sustainable economy.

In summary, low-carbon hydrogen represents a bright alternative to mitigate climate change and achieve ambitious emission reduction targets. While challenges exist, its capacity to serve as a flexible and clean energy carrier is widely recognized. In the process of navigating the transition towards a more sustainable future, conducting comprehensive research on hydrogen becomes crucial to empower its pivotal role and visualize where the industry is headed. Indeed, by advancing the understanding of hydrogen's potential, research efforts contribute to shaping informed strategies for a better planning and preparation for a hydrogen future.

In this regard, the scope of this research is to provide a comprehensive analysis of the green hydrogen market, with a focus on the current state and outlook of electrolyser manufacturing.

Given its relevance, several market studies have appeared in recent years on various aspects of green hydrogen. However, most research focuses on hydrogen demand and policy-related questions, failing to investigate other topics more carefully. For this reason, this deep-dive scrutiny is fundamental to grasp the evolution of the electrolyser manufacturing market and its future outlook, given its nascent stage and rapid expansion. By carefully investigating this field, this analysis endeavors to provide valuable insights into the projected size and performance of the market in the coming years, which can guide a variety of stakeholders in making informed decisions and foster the continued advancement of the industry.

The addressed research questions can be summarized as follows:

- How will green hydrogen demand evolve in the coming years, until 2030 and 2050?
- What is the required electrolyser capacity to fulfill this demand? Will projected electrolyser

manufacturing capacity effectively reach the required installed capacity?

- Which will be the size of the electrolyser market in 2030 and 2050, respectively?
- Which key factors will serve as catalysts for driving future growth within the sector?
- What is the current and predicted financial performance of an important electrolyser manufacturer?

Following a theoretical overview of the green hydrogen's production process (Chapter 1), this research pivoted to analyze green hydrogen both from demand-side and supply-side perspectives (Chapter 2). On the demand-side, pathways for green hydrogen were constructed to show that the demand will reach 21 million tonnes (Mt) and 411 Mt by 2030 and 2050, respectively. On the supply-side, the spotlight was on future installed electrolyser capacities, questioning whether they will suffice to meet green hydrogen demand forecasts. With this purpose, a market analysis of a sample of electrolyser manufacturers identified current, planned, and forecasted global capacities, expected to reach 260 gigawatts (GW) by 2030 and 5,081 GW by 2050. Cumulatively, these data yielded a total sales value of electrolyser systems worldwide amounting to $81.1 billion by 2050.

To explore the electrolyser manufacturing market further, a panel data regression analysis was conducted to uncover the critical drivers that will spur future growth within the sector, at both company and industry levels (Chapter 3). These drivers were identified as a commitment to innovation, robust liquidity management, vigilant market expansion alongside judicious cost control, and strategic M&A initiatives.

Finally, a key market player, namely McPhy Energy SA, was selected to assess its current standing in terms of financial status and overall market value and to predict its future financial performance (Chapter 4). This examination revealed an impressive future growth trajectory for McPhy Energy SA in terms of revenues and profitability, underscoring a fair share price that is 60% above its current market price (€13.49 versus €8.43, as of June 25, 2023).

1. Hydrogen Production from Water Electrolysis

Hydrogen (H_2) can be obtained using a range of different energy sources and technologies, with hydrocarbons currently representing the primary feedstock to produce hydrogen. De facto, in 2021, global hydrogen production totaled 94 Mt, of whose 62% deriving from natural gas and 19% from coal (IEA, 2022). This dependence on fossil fuels implies that significant carbon dioxide (CO_2) emissions are released into the atmosphere when hydrogen is produced: for instance, in 2021, around 900 Mt of CO_2 were emitted from hydrogen production. This highlights the need for supporting and incentivizing low-emission alternatives to generate hydrogen.

In this regard, water splitting is the most desired approach for renewable-based hydrogen generation and the one with the highest potential looking ahead. Water splitting could be performed using various power sources, namely electricity, thermal energy, photonic energy, and the metabolism of microorganisms. Electricity is the most widely used energy source for this purpose: when electricity derived from renewables (i.e., solar, wind) is used to break water into hydrogen and oxygen, the process is called "electrolysis" and hydrogen takes the name of "green hydrogen". In this regard, IEA forecasts a rapid scale-up of the machinery used to perform electrolysis, which will make low-emission hydrogen production flourish by 2030 (IEA, 2022).

Water electrolysis takes place in an electrolysis cell (Figure 1), where two electrodes, a cathode and an anode, are put in an electrolyte solution (i.e., water) and connected to the power supply. When electricity flows through the cell, water is decomposed to produce hydrogen on the cathode and oxygen on the anode (Yue et al., 2021). There exist four key electrolyser technologies (Nasser et al., 2022): Alkaline Water Electrolyser (AWE),

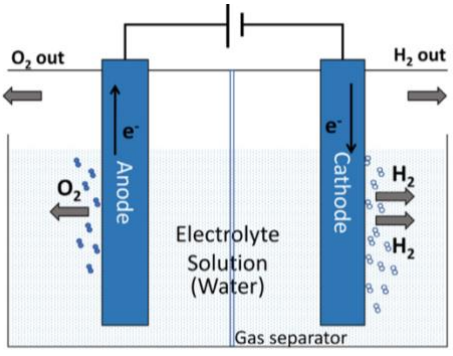


Figure 1: Water Electrolysis Principle (Yue et al., 2021)

Proton Exchange Membrane (PEM), Anion Exchange Membrane (AEM) and Solid Oxide Electrolyser (SOE). Figure 2 shows a schematic illustration for AWE, PEM and SOE's functioning,

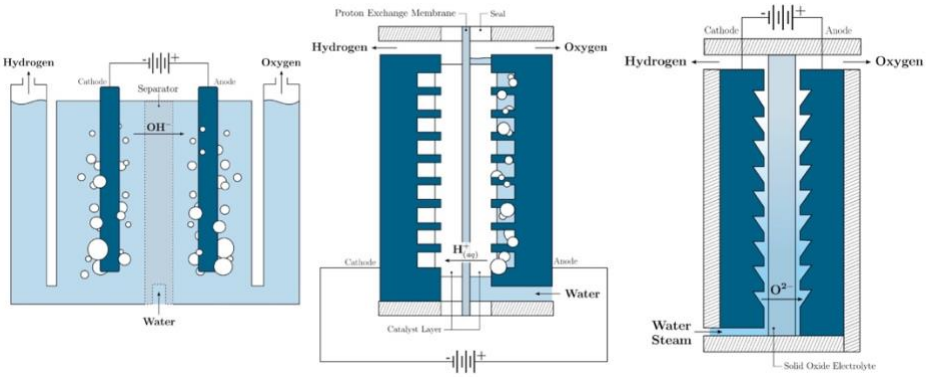


Figure 2: Alkaline Water, Proton Exchange Membrane and Solid Oxide Electrolysers (Vidas & Castro, 2021)

respectively. AWE is the most mature technology currently on the market. It is maintained in a large-scale unit, does not require the use of noble materials, and involves relatively lower capital costs. Nevertheless, frequent start-ups and a varying input power negatively affect the system's efficiency and hydrogen's purity. Furthermore, it implies the use of a corrosive liquid electrolyte. Unlike AWE, PEM benefits from a compact and simple design, alongside a rapid response to the fluctuating power from renewables and the production of hydrogen with a high level of purity and a high efficiency. Additionally, it uses a solid polymer membrane electrolyte, thus avoiding corrosion problems. However, it is relatively more costly due to the noble materials it is made of (i.e., platinum, iridium, ruthenium) and has a relatively lower durability. The third technology, the one of AEM, has been recently designed as an alternative to the more traditional types of electrolysers. Substantially, it constitutes a combination of AWE and PEM, aimed at addressing the drawbacks of both. It is suitable for load fluctuation[1] and made of cheap components, but research must still be carried out to overcome the low durability issue, the low membrane stability, and the low ionic conductivity. SOE is still at the early-commercial stage and is the only technology which operates at a high temperature. Despite this, the electricity needed to drive the electrolysis process is

[1] Load fluctuation refers to the variation in energy demand over time within an electrical system.

significantly lower compared to low-temperature electrolysers, thereby enhancing the system's efficiency for pure hydrogen production. An additional advantage of SOE are its low capital costs, due to the absence of noble materials. Nonetheless, further scrutiny and experimentation are required to develop a new design capable of supporting the very high temperature requirement and to solve safety issues.

Independently of the electrolyser technology utilized, multiple individual cells of electrolysers can be aggregated to form an electrolyser stack (Yue et al., 2021). By being connected in series, the cells allow the stack to reach a rather high voltage even if each single cell has a low voltage (approximately 2 volts). Electrolyser stacks are the core components of electrolyser systems, but a power supply unit and the Balance of Plant[2] (BoP) are also needed to make these systems operational (Figure 3). Water is pumped into the electrolyser stack, where oxygen and hydrogen are produced following the forementioned electrolysis principle. Afterwards, the produced gases move to the gas separators, where they are separated from water, and to the purification systems, where they are purified and dried. In this context, it is worth mentioning that, if power is supplied through a renewable energy source, typically solar or wind, then the whole hydrogen production process does not involve carbon emissions.

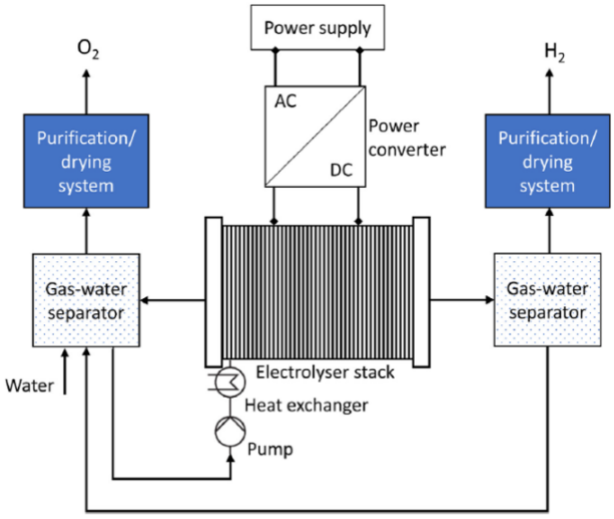


Figure 3: Electrolyser System Structure (Yue et al., 2021)

Subsequently, the produced hydrogen follows a specific process of storage, transmission, distribution, and application which will not be analyzed herein.

[2] The Balance of Plant includes all the supporting components of a power plant needed to deliver energy (i.e., transformers, inverters, protection equipment), except for the main generating unit.

2. Global Hydrogen Electrolyser Market

To conduct the valuation of the global hydrogen electrolyser market and understand its future potential growth, it is necessary to focus on three key components of the market: the demand for green hydrogen, the supply of electrolyser manufacturing capacities and the costs of electrolysers.

For this purpose, a quantitative research method was utilized, which consists in gathering quantitative data, then sorted, classified, and elaborated (MacDonald & Headlam, 2009). Specifically, the first step is the collation of secondary data[3], which allows to gather information regarding the green hydrogen market from a variety of sources, including studies from renowned international institutions (i.e., governmental organizations, think tanks), reports by companies (i.e., financial reports, sustainability reports) and the main financial database of use (Refinitiv Workspace). Starting from historical data, the second step consists in the creation of predictions regarding future market outlooks, based on the different forecasted scenarios that might eventually verify. Therefore, by conducting a baseline study on the current market situation and constructing related forecasts, this research aims to build new innovative knowledge on the existing one.

The advantages of this methodology are numerous. In the first place, robust and accurate data collection ensures the presentation of a very credible and clear picture on the current outlook of the market. Additionally, long-term predictions allow to dispose of previsional information on which strategic decisions can be made today. Nevertheless, disadvantages do not have to be neglected. Firstly, the reliance on secondary data rather than on primary data involves the absence of direct control over what is collected by the external source of reference. Secondly, forecasts cannot provide a totally trustworthy future outlook. Indeed, despite being built meticulously and with a reasoned logic, reality might end up differing from pre-built scenarios.

[3] Unlike primary data, collected directly through surveys, interviews, observations or experiments, secondary data have been collected by other researchers or organizations and repurposed for this study.

2.1. Green Hydrogen Demand

While most sources agree that green hydrogen demand will rise as a result of more extensive energy goals around the world, the size of this increase is uncertain due to the opposing views regarding the effectiveness of the commitments made by governments. In this context, the analysis of different publications and energy scenarios can be helpful to reliably estimate the future green hydrogen demand.

Specifically, five publications were analyzed, whose authors are bp (formerly known as British Petroleum) (2023), the Hydrogen Council (2021a), the International Renewable Energy Agency (IRENA, 2020), the Energy Transitions Commission (2021) and the International Energy Agency (IEA, 2022). In recent years, given the understanding of the rapid transition towards a more sustainable economy, these renowned institutions developed energy scenarios based on the more optimistic or pessimistic predictions about renewable energy adoption, the deployment of a consistent energy infrastructure and the achievement of certain energy targets. Following these scenarios, they tried to gather as much information as possible regarding the role that hydrogen is currently playing and may play in the future, thereby identifying potential green hydrogen pathways that might eventually verify in the coming decades.

The careful analysis of these reviews resulted in the representation of eleven different hydrogen scenarios, whose results are outlined in Figure 4 and Appendix B. In 2030, the most optimistic scenarios predict 30 Mt of green hydrogen demand, whereas the most pessimistic only 9 Mt of H_2. This gap is relatively restrained if compared with the one of 2050, amounting to 751 Mt, showing that a reliable estimation becomes increasingly difficult the further into the future. Indeed, in 2050, the most optimistic scenario forecasts a demand for green hydrogen equal to 776 Mt and the most pessimistic scenario only 25 Mt.

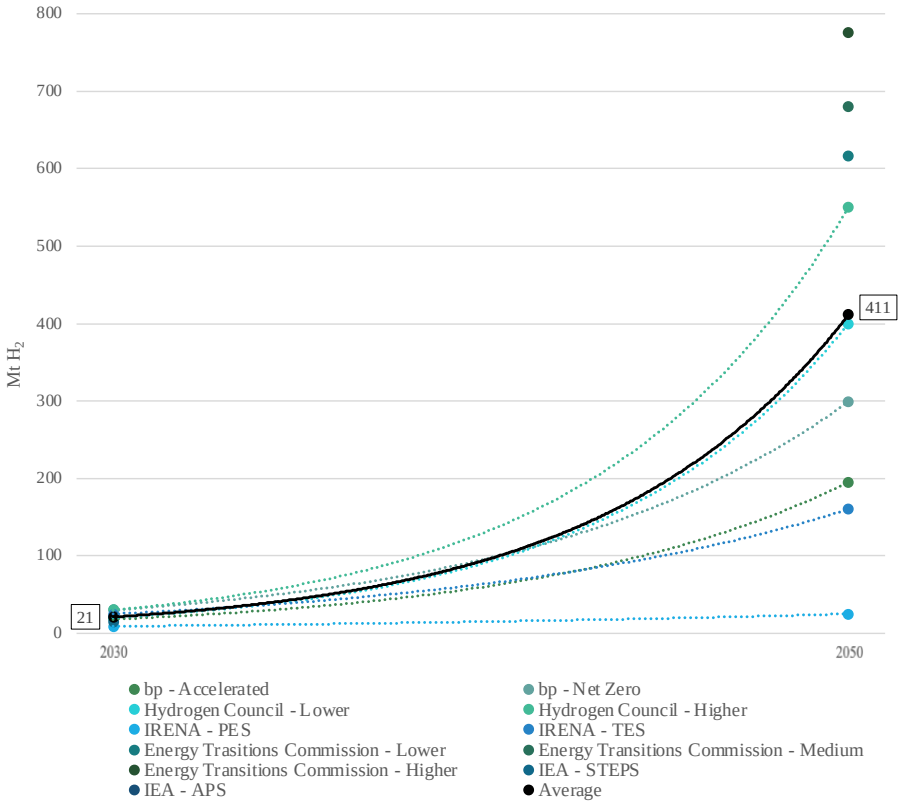


Figure 4: Green Hydrogen Demand Forecasts
(lines between data points serve only as guidelines for the eyes)

This study considers the averages of the different scenarios as the most probable green hydrogen demand estimates, namely 21 Mt in 2030 and 411 Mt in 2050, with these values being particularly similar to those presented by the Hydrogen Council in its conservative scenario (20 Mt in 2030 and 400 Mt in 2050). These projections represent a significant leap if compared to the current numbers. In fact, as reported by IEA's "Global Hydrogen Review 2022" (2022), the global production of hydrogen from water electrolysis in 2021 equaled only 0.04 Mt (i.e., 0.04% of the total hydrogen production). This assessment implies that forecasted green hydrogen demand uptakes involve a Compounded Annual Growth Rate (CAGR) of 100.6% between 2021 and 2030 and a CAGR of 16.03% between 2030 and 2050. Given the industry's nascent stage, capturing historical data to justify these high growth rates can be challenging. However, IEA (2021) highlights a 100% CAGR between 2020 and 2021, underpinned by a doubling hydrogen production (from 0.02 Mt to 0.04 Mt). This lends credibility to a very high growth trajectory over the next 8 years, expected to moderate by 2050. It is also worth noting that technological advancements, supportive mechanisms, and targeted investments are expected to fuel this growth, underlining the plausibility of such a rapid development in the green hydrogen industry.

2.2. Required Installed Electrolysis Capacities

To actualize the hydrogen economy, it is not merely a matter of forecasting future green hydrogen demand. It is equally essential to ensure that there are sufficient hydrogen production capacities capable of accommodating this anticipated demand. When talking about capacity in the context of hydrogen, reference is to "installed electrolysis capacity", which is the cumulative electrical power that can be consumed by all electrolysers installed within a certain area. Indirectly, this also indicates the maximum potential rate of hydrogen production. The logic is straightforward: the more electricity electrolysers are able to consume, the more hydrogen they can potentially generate.

Therefore, this research undertook the crucial task of computing the required installed electrolysis capacities to meet the projected hydrogen demand in 2030 and 2050. In this calculation, an array of four operating hour scenarios were considered, which can be classified depending on the energy source used for operations: photovoltaic energy, onshore wind energy, offshore wind energy and grid-based electricity (full-time operation instance). Energy supply from these sources results in ~1000, ~2000, ~4500 and ~8500 full load hours[4] per year (Brunner et al., 2020).

To create a framework for these projections, a series of assumptions were made regarding the efficiency of the electrolysis process (5 kilowatt-hours per normal cubic meter) and the mass conversion of hydrogen (0.08988 kilograms per normal cubic meter) (Wappler et al., 2022).

Based on these data, the study found that, in order to produce 21 Mt of hydrogen by the year 2030 and an escalated 411 Mt by 2050, a significant increase in electrolysis capacity is required. More specifically, the installation of electrolysis capacity needs to range between 137 GW and 1,168 GW by the year 2030 and between 2,690 GW and 22,864 GW by 2050 (Figure 5). The

[4] The expression "full load hours" refers to the number of hours a power plant would need to run at maximum capacity to achieve its actual energy output over a given period (i.e., year).

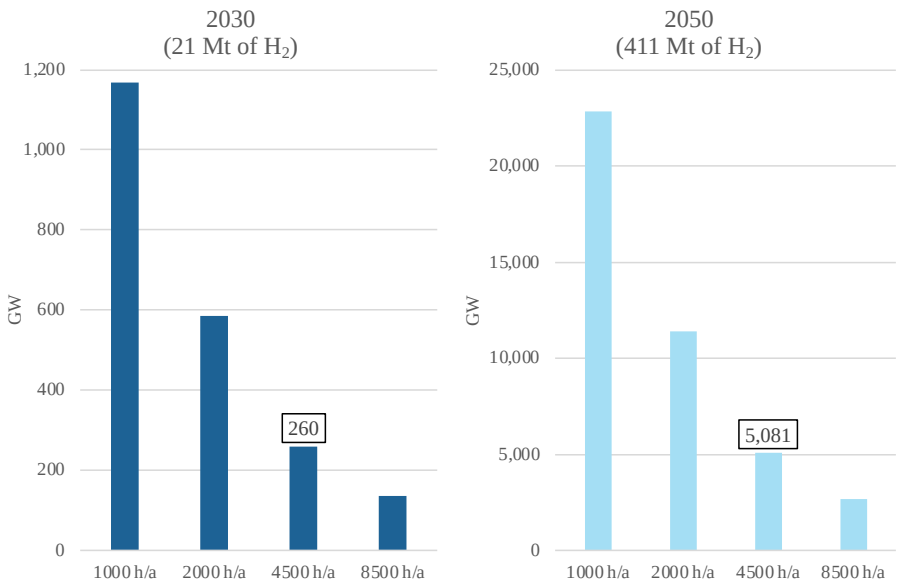


Figure 5: Forecasted Installed Electrolysis Capacities in 2030 and 2050

assumptions underlying these figures, along with the intermediate calculations that led to these final estimates, are thoroughly discussed and presented in Appendix C for a comprehensive understanding.

These scenarios are simplified cases in which a single-source energy, such as solar from a photovoltaic plant, spurs electrolysis. Yet, in a real-world setting, it is more plausible that multiple sources would be combined to mitigate renewable energy's power fluctuations. A case in point is the development of a hydrogen power plant integrating solar and wind energy, which provides a more consistent energy supply for hydrogen production (Siemens Energy, 2023). Current industry practices seem to favor this mixed-sources approach. Thence, this study deems the scenario with approximately 4500 full load hours to be the most realistic. Consequently, the required installed electrolysis capacities for 2030 and 2050 are estimated to be 260 GW and 5,081 GW, respectively, underlining a substantial capacity increase that must be met to fulfill the growing green hydrogen demand. These projections should be contextualized within the global renewable energy capacity available for green hydrogen production. As per IRENA (2023), global renewable energy capacity has more than doubled from around 1,566 GW in 2013 to over 3,372 GW in 2022. If this growth trend persists, it is plausible to envision a future with several tens of terawatts (TW) of renewable energy by 2050. In such a scenario, the forecasted ~5 TW of electrolyser capacity dedicated to green hydrogen production would represent just a fraction of the total renewable energy potential.

2.3. Projected Electrolyser Manufacturing Capacities

Afterwards, this study examined the planned expansion programs of electrolyser manufacturers to assess whether these initiatives are congruent with the previously outlined targets.

To retrieve these data, a sample of electrolyser manufacturers capable of appropriately capturing the entirety of the market was identified. With this aim, the screening tool available on Refinitiv Workspace was leveraged by looking for public and private companies worldwide with the specific word "electroly"[5] in their business descriptions, leading to a sample of 972 firms.

In evaluating the global electrolyser market, both private and public companies were considered to avoid underestimation. In fact, despite lesser data disclosure by private firms, their inclusion prevents any sample size reduction. A "business description" criterion was also used to identify companies with a business model related to electrolysis. However, given the diverse uses of electrolysis across industries, a further manual screening was performed to refine the selection of firms and ensure that they directly engage in green hydrogen production.

A final sample of 54 companies, presented in Appendix A, was generated to represent the entirety of the electrolyser market. These companies operate in four continents (Asia, Australia, Europe, and North America), with the United States being the most represented country, and most of them are public entities rather than private (29 versus 25). It is worth noting that major renewable energy companies are not included in this sample. This is because, as of the present, they acquire electrolyser systems through partnerships or direct purchases from specialist manufacturers, rather than producing in-house. While it is likely that these energy giants might start in-house electrolyser production in the future, as hinted by EDPR's plans (2023), current data insufficiently supports this prospect, precluding its inclusion in the analysis.

[5] This choice was made to gather simultaneously companies whose business description included the words "electrolysis", "electrolyser(s)" or "electrolyzer(s)".

Upon establishing the sample of electrolyser manufacturers, data on projected manufacturing capacities were acquired from the companies' websites, published reports and international newspapers. In instances in which this information was not readily available, it became necessary to engage directly with the companies in order to obtain the desired data. Since certain companies have refrained from disclosing their production capacities, it was feasible to procure data for 37 out of the total 54 companies in the sample (Appendix D). This allowed the quantification of their total projected manufacturing capacity ramp-up until 2030, which was found to be approximately 155 GW. To address the information gap related to the companies which withheld their production capacities and estimate the total electrolyser manufacturing capacity, an assumption was made. If the remaining 17 companies in the sample are expected to produce a capacity equivalent to the average production of the known 37 companies (about 4 GW per firm), then the total manufacturing capacity would amount to approximately 226 GW by 2030. In terms of technology, most of these capacities are attributed to AWE and PEM electrolysers, with only a minor portion of production associated to AEM, SOE and other proprietary technologies. Using BloombergNEF's (2022) global electrolyser manufacturing capacity as a baseline, which stood at 2 GW at the end of 2022, these projections correspond to a CAGR of 80.5% between 2022 and 2030. Despite this impressive growth trajectory, it appears challenging to reach the required 260 GW (see section "2.2 Required Installed Electrolysis Capacities"). While it is plausible to expect that manufacturing production would surge in response to an increase in market demand, it is evident from the forecasted scenarios that electrolyser manufacturing capacities need to undergo a substantial expansion to meet the objectives.

With respect to the year 2050, the lack of well-founded documentation for this timeframe necessitated the development of two distinct forecast scenarios:

1. The first scenario assumes the full utilization of all projected manufacturing capacities, thus

harnessing the planned 226 GW.

2. The second scenario anticipates a 70% utilization factor of manufacturing capacities as of 2030, leading to only 158 GW being used out of the planned 226 GW (Monitor Deloitte, 2021).

For each of these two forecast scenarios, three market scenarios were developed to assess different market formations from 2030 to 2050:

1. An average manufacturing capacity growth of 10% per annum (p.a.).
2. An average manufacturing capacity growth of 20% p.a.
3. An average annual manufacturing capacity growth sufficient to meet the required electrolyser capacity of 5,081 GW by 2050.

As illustrated in Figure 6, it is clear that an annual electrolyser manufacturing growth rate of 10% would fall short in meeting the projected 2050 target under both considered scenarios. This underlines the necessity for a more aggressive growth strategy. Conversely, an ambitious 20% annual growth rate would suffice in both cases. To put it into perspective, under "Forecast Scenario 1", an annual growth rate of 16.85% would be needed to align with the targeted 5,081 GW, while "Forecast Scenario 2" would demand a slightly higher annual growth rate of 18.95%.

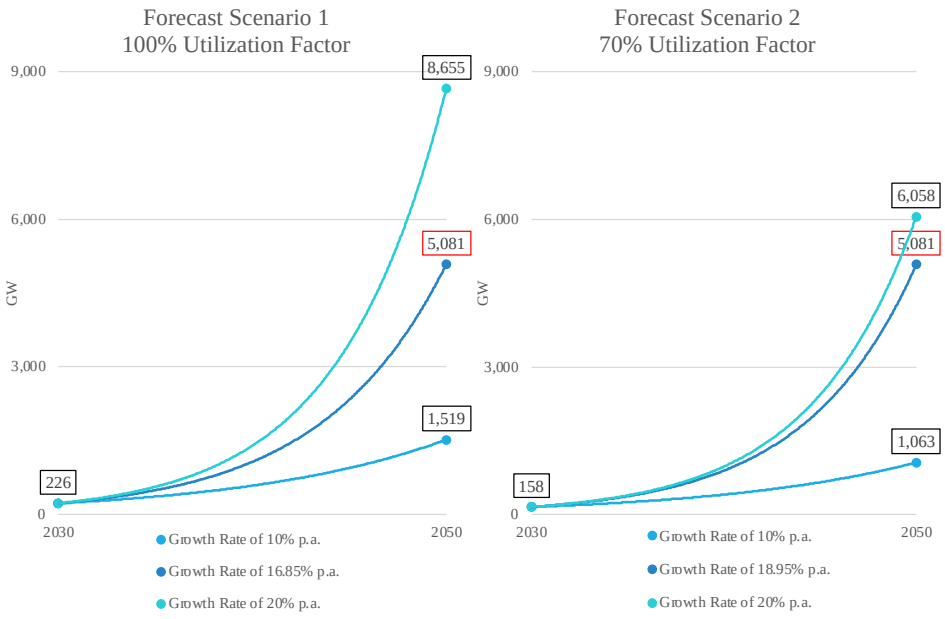


Figure 6: Installed Capacities by Forecast and Market Scenarios

2.4. Electrolyser System Prices

For a comprehensive understanding of the market's evolution, it is crucial to evaluate the cost competitiveness of green hydrogen. According to the Hydrogen Council (2021b), the economic viability of renewable hydrogen hinges on three fundamental factors, which will allow it to break even with non-renewable hydrogen by 2030. First, the decline in the Levelized Cost of Electricity (LCOE) will make renewable energy sources progressively more affordable and advantageous, thereby upholding the financial case for green hydrogen production. Second, improved electrolyser utilization rates will boost the productivity of large-scale, integrated hydrogen projects. In fact, higher utilization translates into higher hydrogen output for the same installation, improving its economic viability. Third, a decline in CAPital EXpenditures (CAPEX) related to electrolysers will enhance their attractiveness. Indeed, lower capital costs can impact the feasibility of green hydrogen projects, rendering them more appealing. These factors will act to bring down the Levelized Cost of Hydrogen (LCOH) for customers, thus guiding cost competitiveness in the industry.

Electrolyser CAPEX is a fundamental variable to estimate the future size of the global electrolyser market. Therefore, it was forecasted that electrolyser system costs could drop to around 400$/kW by 2050, depending on the technology of reference (Figure 7). Appendix E outlines the source estimates which were the foundation for these personal projections.

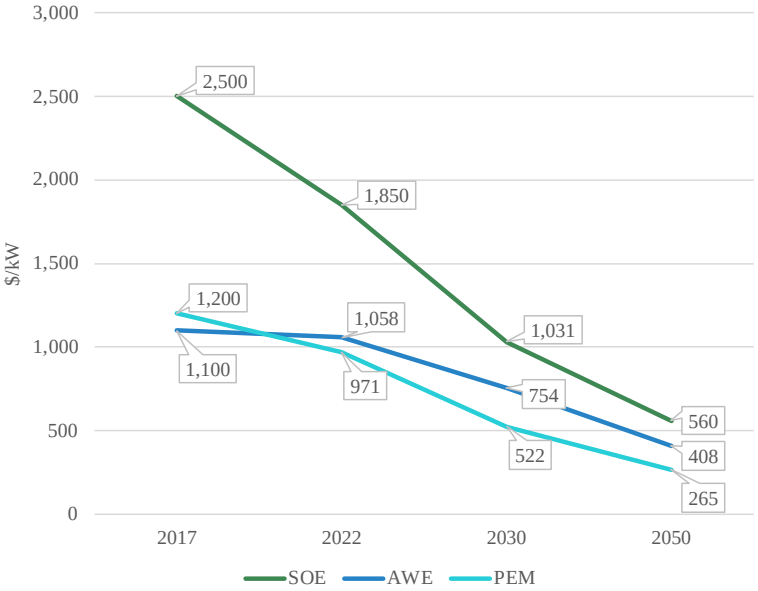


Figure 7: Forecasted Electrolyser System Costs by Technology

2.5. Market Size

In this analysis, the estimation of the electrolyser market size employed a "top-down" market sizing approach, which is founded on quantifying the total potential demand for a product or service and then by multiplying it by its unit price to estimate the total market value (International Finance Corporation, 2023). In the case of the electrolyser market, this technique involved estimating future installed electrolysis capacities and multiplying them by the average price of an electrolyser system, data which have been already carefully elaborated.

Still, to make the data set viable for this computation, two modifications were necessary, one for each data series.

Firstly, the forecasted electrolyser system costs were averaged out between AWE and PEM. This assumption was made in light of the existing challenges faced by SOE in attaining commercial viability on a large scale prior to 2030 (He et al., 2023). Consequently, electrolyser system prices were set at $1014.5/kW, $638/kW, and $336.5/kW for the years 2022, 2030 and 2050, respectively.

Additionally, it was necessary to pivot the focus from the total installed electrolyser capacity to annual additions in capacity. This shift is logical because market sizing seeks to capture the additional value generated each year, rather than merely considering the total capacity at a given point in time, which might include systems installed many years ago. This is the reason for which market size estimations typically consider annual sales rather than cumulative sales up to a certain date. Hence, total installed electrolyser capacities were converted into annual electrolyser deliveries by assuming a constant annual delivery rate. While this assumption provides a reasonable basis for the analysis, it is a simplification and may not perfectly capture the nuances of real-world market dynamics. Overall, this process yielded annual electrolyser deliveries of 0.59 GW for 2022, 32.2 GW for 2030 and 241.1 GW for 2050.

These steps constituted the foundations for the estimation of the electrolyser market size, as shown in Figure 8. At present, the electrolyser market is valued at approximately $594 million.

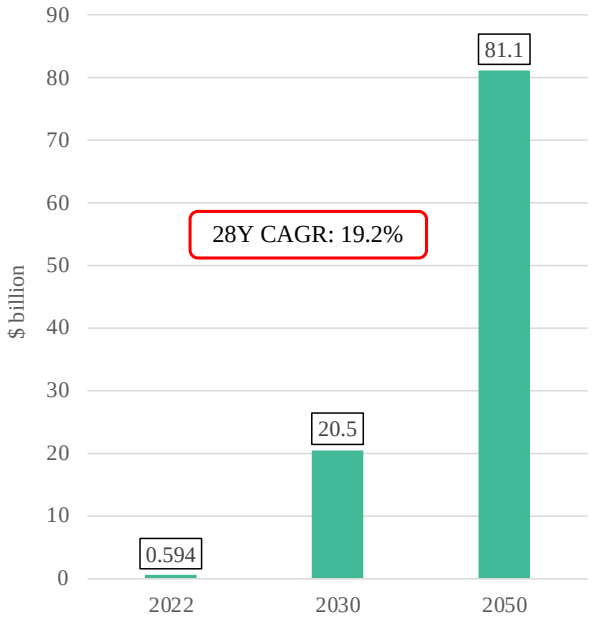


Figure 8: Electrolyser Market Size

This figure represents the total sales of all electrolysers that were brought to life in 2022, underscoring its current niche position in the broader renewable energy and hydrogen markets. For comparison, recent research estimates the global wind energy market at roughly $80 billion (Precedence Research, 2023) and the solar power market at $200 billion (Precedence Research, 2022). However, the electrolyser market is burgeoning with potential. In fact, projections indicate that the market could reach a valuation of $20.5 billion by 2030. This translates into an impressive CAGR of 55.7% over the next eight years, fueled by the rise in demand and supply previously discussed. Looking further ahead, by 2050, the market is envisaged to expand to a substantial $81.1 billion, implying an overall CAGR of 19.2% from 2022 to 2050. In other words, this forecast represents the total value of all electrolysers expected to be sold in 2050 to fulfill the projections detailed in previous sections.

These growth prospects underscore the massive potential of the electrolyser market, drawing the attention of plenty of stakeholders, including policymakers, industry managers and investors. Recognizing green hydrogen as a potential solution to climate change, policymakers can facilitate policy reforms and incentivize further deployment of hydrogen technologies. Industry managers can diversify their portfolios, establish partnerships for integrated hydrogen solutions and ensure competitiveness in an evolving energy landscape. Moreover, the electrolyser market's high projected CAGR presents an attractive investment opportunity that investors should consider.

3. Drivers of Future Company and Industry Growth

To gain a holistic understanding of the electrolyser market, it is also necessary to conduct an in-depth examination of the drivers that will spur this impressive growth within individual companies and, subsequently, the industry at large. To this end, the study was enriched by an investigation into the dynamics of the factors that influence the profitability of the firms in the sector.

The methodology employed adheres to a six-step flowchart, consisting of the following sequential stages (Chatterjee & Hadi, 2012):

1. Selection of relevant variables. The initial step involved identifying potentially significant variables, both dependent and independent, relevant to the research problem.
2. Data collection. The next step consisted in the systematic collection of data corresponding to the chosen variables.
3. Data pre-processing. Collected data underwent a series of screening and cleaning procedures to enhance data quality and ensure their reliability, preparing them for subsequent analyses.
4. Model specification. The following step entailed the identification of appropriate statistical models that would effectively express the relationship between dependent and independent variables.
5. Model fitting. Using the data and the selected statistical model, model parameters were estimated, demonstrating how changes in the independent variables impact the dependent variable.
6. Model validation. The underlying assumptions of the selected statistical model were verified to ensure the model's adequacy. In case all assumptions held true, the model was considered suitable, and the process was concluded. If one or more assumptions were violated, then the process was repeated in an iterative way until a satisfactory result was achieved.

Within these stages, a multi-year panel data regression analysis, executed using Stata 17 (StataCorp, 2021a), was performed over a subset of the 54 companies identified earlier, namely 29 publicly traded electrolyser manufacturers. These companies were selected from the broader sample because public firms tend to provide greater data availability, allowing for a more thorough and accurate analysis. These 29 firms constitute a representative cross-section of the entire electrolyser manufacturing market and are spread across various geographic locations globally, as detailed in earlier sections. Being a multi-year analysis, this examination spanned an entire decade, from 2013 to 2022. Compared to a simple cross-sectional or time-series analysis, the employed methodology allowed not only to capture the immediate impacts over profitability, but also the longer-term trends and patterns, paving the way towards the exploitation of these drivers to guarantee growth within the electrolyser manufacturing market.

3.1. Variables' Selection

The initial phase of the analysis demanded a careful selection of variables, both dependent and independent.

Given the goal to gauge the financial performance of electrolyser manufacturers, the focus was given to profitability indicators. This choice stems from the fact that green hydrogen is a young and high-growth industry, where electrolyser manufacturers are still struggling to present positive financial results due to insufficient policy support, consistent investments in innovation and few hydrogen projects. In this context, profitability indicators might provide a more straightforward way to grasp the evolving financial stability of these firms. Specifically, based on an assessment of the prior literature on financial performance (Capon et al., 1990), two profitability indicators were chosen: Gross Profit Margin (GPM) and Tobin's q. The former, derived from the ratio of gross profit to sales, is an accounting-based indicator of financial performance, helping to capture

the efficiency of production and operational processes. The latter, computed as the ratio of market capitalization to total assets, is a market-based measure of financial performance, providing insights into the market's perception of a company's future growth prospects.

In the pursuit of discerning the influences on these two profitability metrics, several explanatory variables were scrutinized. Primarily, sales, total assets, the number of employees and market capitalization were examined to understand the impact of company size on profitability. Along the same line, the company's number of years of operations was considered to assess the influence of firm age on financial performance. Risk, an undeniable factor in any financial analysis, was evaluated through the Debt-to-Assets (D/A) ratio, the Debt-to-Equity (D/E) ratio and the CAPM beta. Furthermore, keeping in mind that investments are a priority for growth-oriented firms, their role was investigated by selecting CAPEX and Research and Development (R&D) expenses as two additional regressors. Growth, another critical aspect of the analysis, was probed via the annual growth rate of sales and the annual growth rate of assets. Additionally, three liquidity ratios, namely the current ratio, the quick ratio, and the cash ratio, were incorporated to lend more depth to the evaluation. To understand the link between profitability and market perception, the Price-to-Earnings (P/E) ratio was also scrutinized. Lastly, acknowledging the potential impact of Merger and Acquisition (M&A) activities on profitability, a binary dummy variable was introduced: it assumed a value of 1 if the company engaged in at least one M&A activity in a given year; otherwise, it was equal to 0.

Data pertaining to both dependent and independent variables were collected from Refinitiv Workspace. When not directly available, they were calculated on Microsoft Excel using their components (i.e., numerators and denominators), also retrieved from Refinitiv. Subsequently, data were imputed into Stata 17, the chosen statistical software for the analysis. The entirety of variables, along with corresponding formulas and categorizations, is presented in Table 1.

Category	Variable	Name in Regression Output	Specification
Dependent Variables			
Profitability	GPM	GPM	$\frac{Sales - Cost\ of\ Goods\ Sold}{Sales}$
	Tobin's q	TOBIN	$\frac{Market\ Capitalization}{Total\ Assets}$
Independent Variables			
Firm Size	Sales	SALES	$Revenue\ from\ Business\ Activities$
	Total Assets	ASSETS	$Total\ Assets$
	Number of Employees	EMPLOYEES	$Average\ Annual\ Employees$
	Market Capitalization	MKTCAP	$Share\ Price * Number\ of\ Shares\ Outstanding$
Age	Number of Years of Activity	AGE	$FY_{+1} - Foundation\ Year$
Risk	D/A Ratio	DA	$\frac{Total\ Debt}{Total\ Assets}$
	D/E Ratio	DE	$\frac{Total\ Debt}{Total\ Shareholders'\ Equity}$
	Beta	BETA	$CAPM\ Beta$
Investments	CAPEX	CAPEX	$Capital\ Expenditures$
	R&D	RD	$Research\ \&\ Development\ Expense$
Growth	Annual Growth Rate of Sales	GSALES	$\frac{Sales_t - Sales_{t-1}}{Sales_{t-1}}$
	Annual Growth Rate of Total Assets	GASSETS	$\frac{Total\ Assets_t - Total\ Assets_{t-1}}{Total\ Assets_{t-1}}$
Liquidity	Current Ratio	CURRENT	$\frac{Total\ Current\ Assets}{Total\ Current\ Liabilities}$
	Quick Ratio	QUICK	$\frac{Total\ Current\ Assets - Total\ Inventories}{Total\ Current\ Liabilities}$
	Cash Ratio	CASH	$\frac{Cash\ and\ Short\ Term\ Investments}{Total\ Current\ Liabilities}$
Market Perception	P/E Ratio	PE	$\frac{Share\ Price}{Basic\ EPS}$
M&A Activity	M&A	MA	Dummy variable: 1 if the company has conducted at least one M&A activity in the given year; otherwise, 0

Table 1: Dependent and Independent Variables

3.2. Data Pre-Processing Techniques

Before applying statistical models, a series of pre-processing techniques were implemented to make the data ready for model fitting.

First, potential outliers were inspected with the aim of preventing any distortion to the interpretation of the data and any imbalance in the results of the analysis. To identify these possible anomalies, box plots were constructed for all variables under consideration. Consequently, it was chosen to eliminate the uppermost 1% and lowermost 1% of the data, replacing them with missing values. This approach corresponds to trimming the data below the 1st percentile and above the 99th percentile.

Next, the attention was turned to the detection of multicollinearity among independent variables. Multicollinearity arises when two or more independent variables share a linear relationship, potentially obscuring the real relationship between dependent and independent variables by inflating regression coefficients (Gordon, 2020). To unmask multicollinearity, Variance Inflation Factors (VIFs) associated with each variable were observed. Indeed, they provide a measure of how much the variance of a given estimated regression coefficient is amplified due to the existing correlation among regressors. A variable's VIF is computed using the following formula:

$$VIF_i = \frac{1}{1 - R_i^2}$$

where R_i^2 is the unadjusted coefficient of determination obtained by regressing the i^{th} regressor on the other ones. A rule of thumb affirms that a VIF exceeding 10 indicates severe multicollinearity (The Pennsylvania State University, 2018), which then requires corrective action. Upon running a VIF test on Stata, seven variables emerged with VIFs above 10, namely the current ratio, total assets, the quick ratio, the number of employees, the D/E ratio, sales, and the growth rate of assets. These variables were subsequently removed from the analysis, leading to 10 remaining

Variable	VIF	1/VIF
AGE	8.017	.125
RD	5.071	.197
GSALES	5.06	.198
CAPEX	4.392	.228
CASH	2.973	.336
MKTCAP	2.226	.449
MA	2.147	.466
DA	1.93	.518
PE	1.921	.521
BETA	1.679	.595
Mean VIF	3.542	.

Table 2: Final VIFs

independent variables, outlined in Table 2 with their respective VIFs.

Lastly, missing values constituted an additional challenge. The solution was found in the application of listwise deletion, a technique that discards an entire observation for a company if any variable within that observation exhibits a missing value. Despite being a more radical technique compared to multiple imputation or mean substitution, this approach allows to safeguard the integrity of the analysis and ensures the interpretability of the data.

3.3. Model Specification

In an empirical research, panel or longitudinal data incorporate data points collected from multiple entities over a sequence of time periods. More specifically, this study encompasses a balanced, fixed, micro-panel data set, featuring observations from 29 electrolyser manufacturers over the span of 10 years.

The panel is designated as "micro" due to the configuration of its dimensions, with the number of time periods ($T = 10\ years$) being smaller than the number of cross-sectional units ($N = 29\ companies$). This allows to avoid issues of non-stationarity in time series, like unit-roots, cointegration and structural breaks, and of cross-country dependence (Baltagi, 2021). Additionally, the panel data set is deemed "balanced" because all entities have measurements in all time periods and "fixed" as the same entities are observed for each time period (Park, 2011).

There are three main models through which panel data regressions can be performed: pooled Ordinary Least Squares (pooled OLS), Fixed Effects (FE) and Random Effects (RE).

In the context of this analysis, both the GPM model and the Tobin's q model were constructed

using pooled OLS without robust standard errors. The pooled OLS approach simplifies the panel data set into a "flattened" version, facilitating a standard multiple linear regression using the OLS technique. This model is mathematically represented as follows:

$$y_{it} = \alpha + X'_{it}\beta + \varepsilon_{it}$$

where:

- y_{it} is the value of the response variable for the i^{th} entity at time t
- i denotes the cross-sectional dimension and t denotes the time-series dimension
- α is the intercept coefficient
- X'_{it} is the vector of K predictor variables for the i^{th} entity at time t
- β is a vector of regression coefficients
- ε_{it} is the random error term

Assuming the non-existence of individual specific effects μ_i, the pooled OLS model provides efficient and consistent parameter estimates (Park, 2011).

The decision to employ the pooled OLS model was informed by several diagnostic tests. Initially, the Hausman test was applied to compare the suitability of the RE and FE models (Hausman, 1978). The result indicated no correlation between individual effects and regressors, making a case for the RE model over the FE. Subsequently, the Breusch-Pagan Lagrange Multiplier test was utilized, revealing no significant random effect within the data, thereby suggesting that the pooled OLS model was adequately equipped to handle heterogeneity (Breusch & Pagan, 1980). Lastly, the Breusch Pagan test for heteroskedasticity detected no presence of heteroskedasticity, eliminating the need for the introduction of heteroskedasticity-robust standard errors (Breusch & Pagan, 1979). For a more detailed understanding of panel data regression models and related diagnostic tests, please refer to Appendix F.

3.4. Pooled OLS Model on GPM

The results of the pooled OLS regression model applied on GPM, including coefficient estimates, statistical significance, and other relevant statistics, are presented in Table 3.

GPM	Coefficient	Std. Err.	t-value	p-value	[95% Conf	Interval]	Sign.
MKTCAP	-1.26e-6	4.43e-7	-2.84	.008	-2.17e-6	-3.52e-7	***
AGE	-.001	3.86e-4	-3.62	.001	-.002	-.001	***
DA	-.046	.095	-0.48	.634	-.239	.148	
BETA	-.033	.023	-1.46	.156	-.079	.013	
CAPEX	7.05e-5	2.39e-5	2.95	.006	2.16e-5	1.19e-4	***
RD	1.23e-4	3.33e-5	3.70	.001	5.51e-5	1.92e-4	***
GSALES	.004	.043	0.10	.920	-.084	.093	
CASH	.003	.005	0.68	.504	-.007	.014	
PE	-2.74e-4	3.00e-4	-0.91	.369	-.001	3.41e-4	
MA	.040	.017	2.29	.030	.004	.075	**
Constant	.294	.044	6.68	.000	.204	.384	***
Mean Dependent Var.		0.241		**SD Dependent Var.**			0.058
R-squared		0.803		**Number of Obs.**			39
F-test		11.386		**Prob > F**			0.000
Akaike Crit. (AIC)		-153.921		**Bayesian Crit. (BIC)**			-135.622
RMSE		0.030					

**** p<.01, ** p<.05, * p<.1*

Table 3: Pooled OLS Model on GPM

The overall statistical significance of the model, as indicated by the $Prob > F = 0.000$, confirms that the regression model contains predictive information. This means that there is no probability that all regression coefficients are simultaneously zero due to random change, suggesting that at least one predictor variable is significantly related to the outcome variable.

The coefficient of determination, denoted as R-squared, is a statistical measure of the model's goodness of fit. With an R-squared of 0.803, it indicates that roughly 80.3% of the variability in GPM can be explained by the independent variables. This result points towards the validity of the selected predictors.

The Root Mean Squared Error (RMSE) of 0.030 further strengthens the model's reliability, indicating a small average difference between predicted and actual values and underscoring the model's high predictive accuracy.

In terms of individual predictors, five variables emerge with statistically significant regression

coefficients: MKTCAP, AGE, CAPEX, RD, and MA. The first four are significant at a 0.01 level, while the latter at a 0.05 level.

The negative coefficient for MKTCAP, though very small due to the unit of measure of this variable (million of $), indicates that the bigger the size of the firm, the lower the company's ability to generate profits from its sales. Even if larger firms tend to benefit from economies of scale, they might experience diminishing returns to scale, where additional increases in production potentially lead to higher costs and thereby reduce margins. AGE presents a negative coefficient as well. This might be due to the fact that younger companies typically use more advanced and efficient technologies, which give them a competitive advantage on the market compared to older firms. Furthermore, both CAPEX and RD present positive regression coefficients: in a young and high-growth industry like green hydrogen, investments foster innovations and efficiencies that, on average, increase revenues and decrease costs. Finally, given the positive coefficient for MA, also M&A activities seem to play an important role in the sector. Explanations could be found in the creation of synergies, an increased market power, diversification opportunities and risk reduction strategies.

The insights gained from this model yield valuable considerations for stakeholders in the electrolyser manufacturing sector. Central to driving growth and profitability is the pledge to continual innovation, driven by a robust commitment to research and development and capital expenditures. Moreover, pursuing strategic M&A activities could unlock numerous benefits at both the firm and industry levels. Additionally, larger and older firms should be attentive of potential diminishing returns to scale and try to offset the adverse effects of scaling up. In this way, companies can chart a path to sustainable, long-term growth. These initiatives do not only drive individual company growth and profitability, but also contribute to the strengthening of the overall industry, ensuring its resilience and sustained evolution.

3.5. Pooled OLS Model on TOBIN

Table 4 outlines the results of the pooled OLS regression model applied on Tobin's q, including coefficient estimates, related p-values, and other relevant metrics.

TOBIN	Coefficient	Std. Err.	t-value	p-value	[95% Conf	Interval]	Sign.
MKTCAP	3.05e-5	6.85e-0.6	4.46	.000	1.65e-5	4.46e-5	***
AGE	-.008	.006	-1.30	.204	-.020	.005	
DA	-1.318	1.504	-0.88	.388	-4.405	1.768	
BETA	-.081	.350	-0.23	.820	-.799	.637	
CAPEX	-2.33e-4	3.71e-4	-0.63	.535	-.001	.001	
RD	4.57e-4	.001	0.89	.383	-.001	.002	
GSALES	.947	.666	1.42	.167	-.420	2.315	
CASH	1.115	.078	14.24	.000	.954	1.275	***
PE	.026	.005	5.55	.000	.016	.036	***
MA	.173	.269	0.64	.524	-.378	.725	
Constant	.348	.684	0.51	.615	-1.056	1.751	
Mean Dependent Var.		1.861		**SD Dependent Var.**			2.228
R-squared		0.969		**Number of Obs.**			38
F-test		83.233		**Prob > F**			0.000
Akaike Crit. (AIC)		58.221		**Bayesian Crit. (BIC)**			76.234
RMSE		0.462					

**** p<.01, ** p<.05, * p<.1*

Table 4: Pooled OLS Model on TOBIN

This model is overall statistically significant, as shown by the $Prob > F = 0.000$. This value suggests that the predictor variables do have some explanatory power on the dependent variable.

The R-squared of 0.969 indicates a very high explanatory power of the model. In fact, it means that approximately 97% of the variation in Tobin's q can be explained by the ten predictor variables included in the model.

An RMSE of 0.462 implies that, on average, the model's predictions deviate from the actual observations by around 0.462 units, suggesting a good performance in terms of predictive accuracy.

There are three statistically significant coefficients (MKTCAP, CASH and PE), all of them with p-values approximately equal to zero.

The positive coefficient for MKTCAP points out at a positive relationship between a company's market capitalization and its Tobin's q. This could be due to the fact that larger firms are generally perceived by the market as having better growth opportunities and being more capable of using

their assets efficiently. The positive coefficient for CASH indicates that firms with larger cash holdings and short-term investments tend to have higher Tobin's q, possibly due to the relationship with strong cash flow generation and financial flexibility. Finally, the positive coefficient for PE suggests a connection between higher P/E ratios and higher Tobin's q. By signaling to the market that investors are expecting higher earnings growth in the future, a high P/E ratio usually translates into a high Tobin's q.

Companies within the electrolyser market can leverage several strategic directions to ensure sustained growth in the long term. First, enhancing market capitalization is pivotal. In fact, market expansion efforts, such as entering new geographic or product markets, could provide substantial growth opportunities, leading to a broader customer base and boosting the overall market share. Second, maintaining a robust liquidity position is crucial to respond quickly to investment opportunities and to weather financial shocks. In this regard, effective cash management, including efficient working capital management and judicious investment policies, are of paramount importance. Lastly, electrolyser manufacturers should strive to optimize their earnings relative to their share price. This means that they should prioritize improving their profitability by increasing revenues and reducing costs, as testified also by the GPM model. This could involve harnessing efficiencies in operations, investing in innovative technologies or strengthening sales initiatives.

In conclusion, these regression results present a strategic roadmap for the realization of the projected growth in the electrolyser manufacturing sector. In essence, it is expected that growth will be fueled by a commitment to relentless innovation, strategic M&A activities, robust liquidity management and judicious market expansion underscored by attentive cost control.

For a more comprehensive understanding of these regression models, Appendix G provides a detailed assortment of Stata outputs (i.e., descriptive statistics, correlation matrix), while Appendix H contains the Stata code utilized for conducting this analysis.

4. Valuation of McPhy Energy SA

The culmination of this research involves the valuation of McPhy Energy SA (hereinafter McPhy or the Company). This serves to provide a snapshot of the potential growth trajectory a company within this industry could experience, aligning with the projected expansion of the market.

Three principal valuation approaches exist according to Damodaran (2012): the Discounted Cash Flow (DCF) valuation, relative valuation, and contingent claim valuation. The DCF valuation methodology was selected for this study due to its suitability in assessing companies within young, high-growth industries where other methods may fall short (McKinsey & Company et al., 2020).

At its core, a DCF valuation calculates the intrinsic value of an asset based on its fundamental properties. It aims to establish an objective value for a company, depicted as a function of the expected cash flows throughout its lifetime and the associated uncertainties (Damodaran, 2023c). Within a DCF valuation, two paths can be followed: equity valuation, which considers only the equity stake in the business, and firm valuation, encompassing all claimholders. Additionally, a choice arises regarding which cash flows to discount at the appropriate discount rate: the total cash flows produced by the firm or the surplus cash flows beyond the required return. This research adopts a firm DCF valuation approach, incorporating total cash flows for a comprehensive analysis.

To enhance the robustness of the DCF valuation, probabilistic methods were also utilized. These include a Monte Carlo simulation, providing possible fair prices based on different input variables, and a two-way sensitivity analysis, investigating the impact of two varying parameters on the valuation. Furthermore, a tornado analysis was implemented, examining the effect of individual variables on the output while holding others constant, and a spider chart analysis, which visually displays the sensitivity of the output to changes in inputs. These approaches aid in assessing the range of possible outcomes and their probabilities, boosting the reliability of the valuation process.

4.1. Company Overview and Current Financial Position

McPhy was established in France in 2008. Since then, it has been a major European industrial player in the green hydrogen market, endowed with a promising technology leadership. It positions itself on two of the five main phases in the hydrogen value chain: hydrogen production by electrolysis and hydrogen distribution. In line with this strategic positioning, its product line is composed of electrolysers and hydrogen refueling stations having small, medium, or large capacities, with production sites in France, Germany, and Italy (McPhy Energy, 2023a). The business model focuses on supporting national and European customers active in energy, mobility, and industry to decarbonize their activities, thereby contributing to the development of low-carbon hydrogen as a solution for the energy transition.

Transitioning to its current financial status, McPhy presents a challenging picture, reflective of the Company's investment-intensive growth strategy and the broader conditions of the green hydrogen industry worldwide.

In 2022, McPhy reported revenues of €16.06 million, representing a growth of 22.3% when compared to the previous year's revenues. Nevertheless, this growth has yet to translate into profitability, with the Company experiencing a total loss of €38.25 million, primarily due to the impact of operating expenses. Furthermore, McPhy's Earnings Before Interest and Taxes (EBIT) margin stands at -250.9%, highlighting the struggle to generate profits from sales, while its Return on Assets (ROA) amounts to -13.3%, indicating an inadequate return in relation to assets employed. Return on Invested Capital (ROIC) and Return on Equity (ROE) are also negative at -332.8% and -28.3%, showing that the Company is not yet able to generate positive returns on its investments nor equity.

Despite facing profitability challenges, McPhy maintains a strong liquidity position, as

evidenced by a current ratio of 2.6, a quick ratio of 2.4 and a cash ratio of 2.1. These indicators highlight McPhy's ability to meet short-term obligations and manage assets efficiently.

Two core indicators illustrate a balanced capital structure with a managed risk profile for McPhy. Its D/E ratio is equal to 1, thereby indicating a perfectly balanced mix of debt and equity in the financing structure. Additionally, with a solvency ratio of 1.8, McPhy demonstrates its ability to cover both short-term and long-term obligations with its own equity.

However, McPhy's operational efficiency metrics present areas for improvement. An average holding period of 276 days, an average collection period of 434 days and an average payable period of 418 days lead to a cash conversion cycle of 292 days. These numbers indicate a prolonged timeframe to convert investments in resources into cash flows from sales, signifying potential inefficiencies which negatively impact the Company's operational performance.

4.2. Reclassification of Financial Statements

In spite of the shaking financial position in which McPhy currently finds itself, the Company is strategically well-positioned to capture opportunities within the high-growth electrolyser manufacturing sector. Its leadership in alkaline electrolysis technologies and the forecasted surge in the electrolyser market size constitute primers for McPhy's financial turnaround in the years to come. To ascertain this possibility of improvement, the DCF analysis began with a reclassification of financial statements, whose aim is to delineate the Company' core operating, non-core operating and financing items (Martins, 2022).

In the Income Statement, core operating items pertain to revenues and costs directly associated with the core business activity of McPhy. In terms of revenues, they include sales from hydrogen fueling stations, electrolysers of large capacity and electrolysers of small capacity, as split in the Company's annual reports. In terms of costs, they include the Cost of Goods Sold (COGS),

employees' compensations, additional operating expenses and amortizations related to tangible and intangible assets. The non-core business category comprises all items which are not strictly necessary to McPhy's operations, including provisions and additional forms of income (i.e., subsidies, research tax credits and income from marketable securities). Finally, financial items relate to the way McPhy finances its activities, thus consisting of taxes, duties, and the cost of debt.

As for the Balance Sheet, operating cash, goodwill, tangible and intangible assets, inventories, accounts receivables and accounts payables were all assigned to the core business segment because they represent the core assets and liabilities through which McPhy operates. Instead, non-core operating items comprise provisions and other non-specified liabilities. Lastly, financing items embody assets and liabilities related to the Company's financing, thus including excess cash, loans, deposits, convertible bonds, investment subsidies, bank borrowings and lease agreements.

4.3. DCF Model and Assumptions

In this context, a DCF model is used to determine the fair intrinsic value of McPhy, that is the fair share price at which the Company should trade, considering its projected financial performance. The cornerstone of any DCF model is the concept of Free Cash Flows (FCF), which represent the leftover of cash freely available to be distributed among stakeholders. In other words, they represent the net amount of cash after considering cash inflows from core and non-core operations and cash outflows for core and non-core investments. Subsequently, historical FCF are projected into the future and then discounted back to their Present Value (PV) by using a discount rate incorporating the investment's opportunity cost, like the Weighted Average Cost of Capital (WACC) (Kruschwitz & Löffler, 2020). The sum of discounted FCF and the discounted Terminal Value (TV), which approximates the value of cash flows beyond the forecasted period, provides an estimate of the company's Enterprise Value (EV), including both the value of debt and equity.

At this point, removing the financial structure of the firm by the EV yields the equity value, which represents the value of the firm attributable to solely equity holders. When divided by the number of outstanding shares, the resultant value is the Company's fair price per share, with which the market price can be compared to assess the undervaluation or overvaluation of the stock.

Having introduced the core components of a DCF model, a series of assumptions were developed to conduct the valuation on McPhy.

Considering the discounting procedure, two key elements play a fundamental role in computing the PV of FCF: the perpetual growth rate and the discount rate.

The explicit forecasting period established for McPhy spans from 2023 to 2050, which is the year in which the Company's financials will stabilize. Beyond this point, it is assumed that cash flows will grow indefinitely at a steady perpetual growth rate of 1.5%. The selection of this rate is grounded on macroeconomic forecasting since it aligns with the average of the expected GDP growth rates in France, Germany, and Italy as of 2050 (PwC, 2017). This assumption implies that McPhy's growth will not exceed the overall economic growth of the countries in which it operates, providing a robust basis for the valuation.

Regarding the discount rate, the one employed in the DCF analysis is valued at 10.71%, which is equivalent to McPhy's WACC and cost of equity. The alignment of these two metrics derives from McPhy's special financial position in 2022, with a negative net debt indicating that the Company had more cash reserves than total debt. Since WACC is computed as the weighted average of the costs of each capital source (debt and equity) by their relevant weights, a scenario in which net debt is negative eradicates the proportion of debt from the WACC computation, causing the WACC to equal the cost of equity (Vernimmen et al., 2022). Understood this equivalence, the computation of McPhy's cost of equity involved a multi-faceted approach, incorporating industry comparisons and risk factors. Specifically, the formula for the cost of equity

is as follows:

$$Cost\ of\ Equity = Risk\text{–}Free\ Rate + Levered\ Beta * Market\ Risk\ Premium + Lambda * Country\ Risk\ Premium$$

The risk-free rate was set at 3%, corresponding to the 10-year yield on French Government bonds and representing the baseline return investors can expect from a risk-free investment. Due to the negative net debt, the Company's levered beta (0.996) mirrors its bottom-up unlevered beta. The latter was obtained from the industry average of eight comparable firms (Hydrogen Refueling Solutions SA, Gaztransport et Technigaz SA, Ceres Power Holdings PLC, ITM Power PLC, Nel ASA, Seche Environment SA, Derichebourg SA and Rubis SCA) and showcases the systemic risk of McPhy's returns relative to the market. The market risk premium (6.79%) was obtained from Damodaran's database and incorporated to account for the expected return, above the risk-free rate, an investor demands to invest in a risky market. Since McPhy operates in three different countries, its country risk premium was computed as a weighted average of each country's risk premium, sourced from Damodaran, and the proportion of revenues McPhy generates in that country, resulting in a value of 1.18% (Damodaran, 2023a). To incorporate the rationale for which not all companies in a certain country bear the same level of country risk, an additional variable, called "lambda", was factored in to account for this variation. Lambda (80.1%) was computed as the ratio between the proportion of revenues McPhy generates in its home country (56.5%) and the proportion of revenues the average French company generates domestically (70.6%), suggesting that McPhy's equity is exposed to less country risk than the average French company due to its international operations (Anconetani et al., 2021). These five factors together yielded a cost of equity of 10.71% (Table 5).

Discount Rate	Data
Risk-Free Rate	3%
Unlevered Beta	0.996
Levered Beta	0.996
Market Risk Premium	6.79%
% Domestic Revenues for McPhy	56.5%
% Domestic Revenues for French Firm	70.6%
Lambda	80.1%
Country Risk Premium	1.18%
Cost of Equity	**10.71%**
WACC	**10.71%**

Table 5: McPhy's Cost of Capital

Having established the perpetual growth and the discount rates, attention is turned to the explicit forecasting of FCF until 2050. This requires making assumptions about each component of the Income Statement and the Balance Sheet. While only the key assumptions will be hereby discussed, an overview of all model specifications and related outputs can be found in Appendix I.

The market analysis yielded a CAGR of 19.2% for the electrolyser market size for 2022-2050 (see section "2.5 Market Size"). To uphold conservatism over a long forecasting horizon, McPhy's revenues were assumed to grow at a lower CAGR of 16.2%[6]. Consequently, revenues in 2050 were calculated using this CAGR and revenues from 2023 to 2025 were sourced from FactSet's consensus, seen as more cautious than Refinitiv Workspace's. Finally, revenues for the years in-between were estimated based on gradually decreasing simple growth rates, ranging from 30% to 5%. According to this logic, McPhy's revenues are projected to surpass €1 billion by 2048.

Expenses were forecasted as revenue percentages. Particularly, COGS surged in 2022 due to the scarcity of raw materials needed for electrolyser and refueling station production. Despite anticipated high prices, they are expected to stabilize at around 20% of revenues by 2027. Payroll charges, in spite of a recent headcount increase, are projected to normalize around 25% by 2028. This is a conservative assumption with respect to the average payout-to-revenue ratio in the manufacturing business, which is equal to 18% (Dutta, 2021). External charges, heightened in 2022 by a focus on industrial activities, are expected to stabilize at around 15% by 2027.

Concerning assets, goodwill is anticipated to remain unchanged until 2050 as no further acquisitions are expected for McPhy. This conclusion is drawn from an analysis of 115 companies within the hydrogen industry, where only 29 were involved in M&A activities in 2022. Property, Plant and Equipment (PPE) were estimated via CAPEX and accumulated amortizations and

[6] This specific value was selected with discretion: it is consistent with the principle of conservatism in financial forecasting and reflects a moderate downward adjustment from the industry average (19.2%).

impairments. McPhy's strategy to decrease CAPEX by 2030, paired with a consistent reduction until 2050, was the foundation for these estimates (McPhy Energy, 2023a). This aligns with the market analysis on electrolyser system costs. Inventory forecasting leveraged the average holding ratio in the durable goods manufacturing sector (1.61) (Lewis), while accounts receivables were based on the average collection period in the industrial and commercial machinery industry (58 days) (ReadyRatios, 2022). Considering McPhy's high current collection period (434 days), it was deemed appropriate to assume the existence of a transition period before reaching the 58-days targeted indicator.

In regard to liabilities, accounts payables were projected according to McPhy's historical average payable period (310 days). In addition, provisions and other liabilities were forecasted based on historical trends to ensure consistent estimations.

4.4. Future Projections and Valuation

The forecasted financials give rise to a positive turnaround for McPhy's currently negative EBIT by 2027. This shift is primarily attributed to the surge in revenues, coupled with cost increments that are less than proportionate to revenue growth. By 2050, EBIT is expected to stabilize at approximately $307.7 million. Simultaneously, the combination of positive core and non-core results and a negative financial result contribute to a shift in total comprehensive income. In fact, the latter is forecasted to enter positive terrain in 2027, rising to an estimated $247.8 million by 2050. The projected trends for both EBIT and total comprehensive income are depicted in Figure 9.

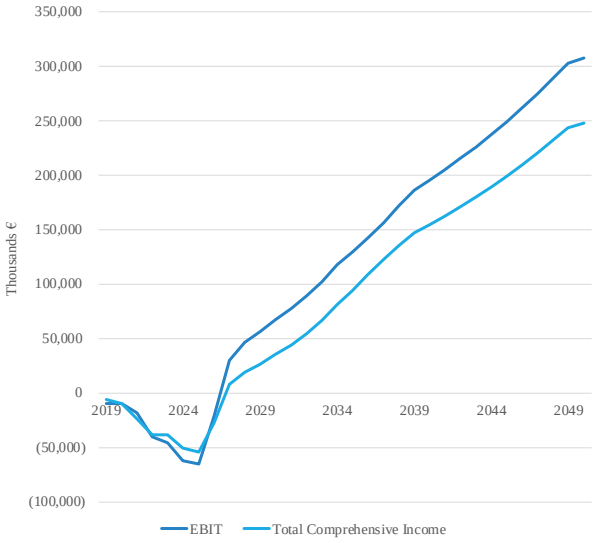


Figure 9: Evolution of EBIT and Total Comprehensive Income

Consistent with historical trends, McPhy's core invested capital is projected to rise throughout the forecasted period. This increase is primarily driven by a growth in tangible and intangible assets, inventories, and accounts receivables. It is worth noting that the pace of this increase will gradually decelerate, shifting from 81.7% to 3%, in line with the assumption of a steady state scenario. The equity value was derived from the total comprehensive income and the transactions with shareholders. Although McPhy does not foresee to initiate a dividend distribution policy in the short term (McPhy Energy, 2023a), it seems improbable that a company with future positive financials would abstain from distributing dividends to its shareholders. Therefore, using the renewable energy industry average from Damodaran as a reference (Damodaran, 2023b), the payout ratio was incrementally adjusted to 10% in 2031 and further to 20% in 2041, giving rise to dividend distribution. Lastly, the calculation of excess cash and total debt is intertwined. Excess cash, if present, is the positive difference between equity and total invested capital. For McPhy, these periods of robust cash generation are expected to occur in 2023 and again between 2036 and 2050. Conversely, during the intermediate period, the Company is not supposed to generate excess cash and finances its operations through debt, mainly via long-term borrowings.

McPhy's ROIC is currently significantly negative, projected to reach its trough at over -2200% in 2023. However, as investments start to yield returns, it is expected to become positive in 2027 and stabilize at a healthy rate of approximately 20% up to 2050. Conversely, ROE will continue to demonstrate volatility over the next decade. Nevertheless, as the business stabilizes, it is projected to gradually trend towards consistency, converging at around 10% in 2050 (Figure 10).

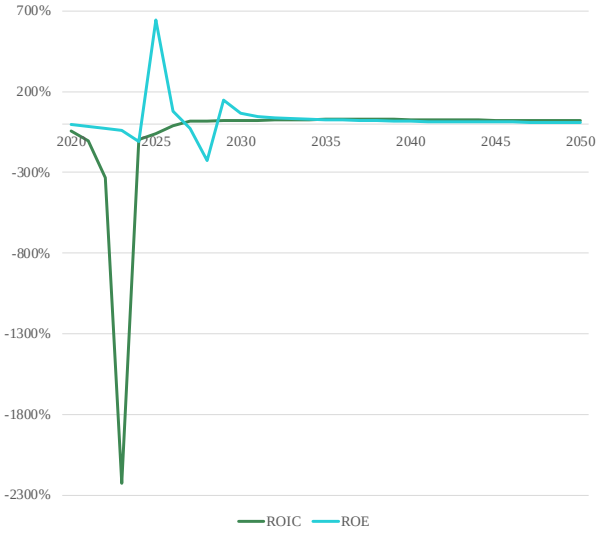


Figure 10: Evolution of ROIC and ROE

Overall, this analysis led to a future scenario where McPhy's FCF become persistently positive from 2028 onwards. Noteworthy is the decelerating growth rate of FCF since 2040, indicating a maturing business transitioning towards a steady-state phase. Additionally, the TV was found to be approximately €2.23 billion, with this figure symbolizing the value of all the projected cash flows that McPhy is anticipated to generate beyond the forecast horizon. Subsequently, the EV was computed by discounting both FCF and the TV, resulting in €243.7 million. This amount embodies the intrinsic market value of McPhy, encapsulating both its equity and debt components. In contrast, the Company's equity value was found to be significantly higher, at €377.2 million. This unique circumstance, in which the equity value surpasses the EV, is attributable to a negative net debt position in the valuation year (2022). Essentially, the Company's liquid assets (i.e., cash and cash equivalents) outweigh its liabilities, leading to an amplified equity value. This phenomenon further emphasizes McPhy's strong financial position and anticipates a prosperous growth.

The comprehensive DCF model yields a fair share price of €13.49 for McPhy, which represents the intrinsic value of the Company's equity on a per-share basis, factoring in future cash flows and growth prospects. As of June 25, 2023, the market price for McPhy stood at €8.43 per share, significantly lower than the estimated fair value. This discrepancy suggests that McPhy's shares are currently undervalued in the market, offering an attractive entry point for investors. Specifically, the valuation indicates an implied premium of 60% over the current market price, highlighting the substantial upside that investors might realize if the market price were to align with the fair share price. In other terms, this premium represents the market's potential underestimation of McPhy's future earnings and cash flows. The key results of the DCF are summarized in Table 6.

Valuation	Data
PV of FCF	€100.4 million
TV	€2.23 billion
PV of TV	€143.3 million
EV	€243.7 million
PV of Financial Business (Book Value)	€133.5 million
Equity Value	€377.2 million
Shares Outstanding	27,958,035
Fair Share Price	**€13.49**
Current Share Price	**€8.43**
Implied Premium	**60%**

Table 6: Valuation Results

4.5. Monte Carlo Simulation, Sensitivity, Tornado and Spider Chart Analyses

Traditional equity valuation encapsulates the riskiness of an investment into a single number, which represents the expected value crafted from a set of underlying assumptions. This approach may result in overlooking the spectrum of potential outcomes and their associated probabilities. In this context, probabilistic approaches offer a nuanced alternative for investment valuation, providing information on the value of the investment under a subset of outcomes (Damodaran, 2007).

A common probabilistic methodology is the Monte Carlo simulation, which leverages repeated random sampling to forecast the behavior of a variable under predefined assumptions, known as "probabilistic" variables. In this analysis, the WACC and the perpetual growth rate were identified as these key inputs since their variability directly influences the output variable, namely the fair share price. Before proceeding with the simulation, it was chosen to assign normal distributions to both the WACC and the perpetual growth rate. The WACC was assigned a mean of 10.71% with a standard deviation of 1.07%, while the perpetual growth rate was given a mean of 1.50% and a standard deviation of 0.15%. The analysis was conducted using Oracle Crystal Ball, a spreadsheet-based statistical package for predictive modeling. Following 100,000 iterations, the resulting fair share price exhibited a right-skewed, leptokurtic distribution (Figure 11). The mean value was 14.1 and the median was 13.48, with a standard deviation of 4.04, skewness of 1.07 and kurtosis of 5.27. These metrics suggest the presence of potential outliers towards higher share prices compared to the price obtained from the DCF analysis. Overall, this perspective marks a wide range of plausible outcomes and the optimistic possibilities suggested by the previous analysis, lending it further credence.

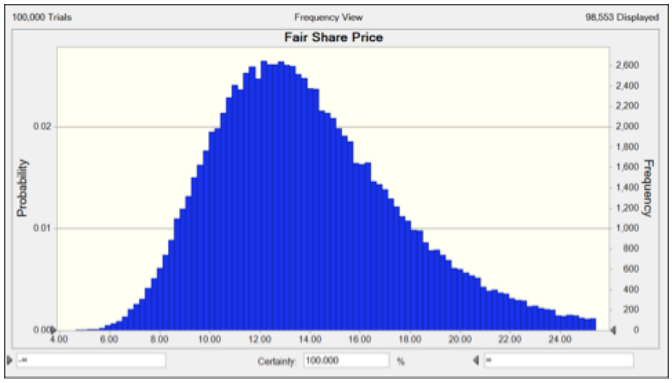


Figure 11: Forecast from Monte Carlo Simulation

A two-way sensitivity analysis is a further probabilistic approach to understand how changes in two input variables concurrently affect a given output. In this case, the sensitivity analysis was conducted on the fair share price by adjusting both the WACC and the perpetual growth rate by increments of +/-2% (Table 7). The best-case scenario, represented by the highest perpetual growth rate of 1.9% and the lowest WACC of 10.3%, yielded a share price of €15.24. On the contrary, the worst-case scenario, characterized by the lowest perpetual growth rate of 1.1% and the highest WACC of 11.1%, resulted in a share price of €12.01. This analysis does not only provide a range of potential share prices under various combinations of inputs, but also highlights the direction of these parameters' impact on valuation. The higher the steady rate at which the Company grows, the higher its fair share price; the lower the cost of capital the Company pays to finance its assets, the higher its fair share price.

		Perpetual Growth Rate				
		1.1%	1.3%	1.5%	1.7%	1.9%
WACC	10.3%	14.70	14.83	14.96	15.10	15.24
	10.5%	13.97	14.08	14.20	14.33	14.46
	10.7%	13.28	13.38	13.49	13.60	13.72
	10.9%	12.63	12.72	12.82	12.92	13.03
	11.1%	12.01	12.10	12.19	12.28	12.38

Table 7: Two-Way Sensitivity Analysis of Fair Share Price

The tornado and spider chart analyses, executed via Oracle Crystal Ball, are visual methodologies used to evaluate the impact of varying inputs on the fair share price. The findings reinforce those gained from the sensitivity analysis: if the WACC increases, the fair share price correspondingly decreases; if the perpetual growth rate increases, the fair share price rises. An additional insight is that these input variables do not affect the fair share price equally, as it can be understood from the length of the bars in Figure 12. In fact, the -2.74 WACC elasticity suggests that a 1% WACC reduction could spur a 2.74% price increase, while a 1% rise in the perpetual growth rate, with an elasticity of 0.06, would slightly elevate the price by 0.06%.

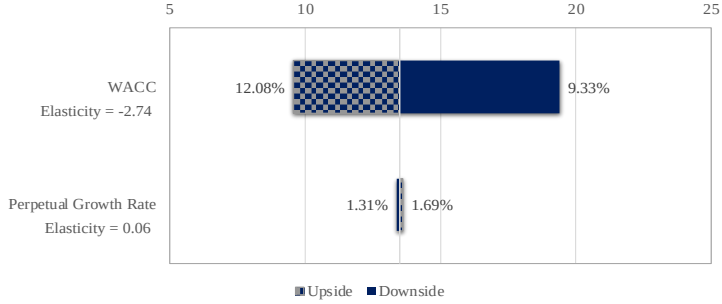


Figure 12: Tornado Chart Analysis of Fair Share Price

4.6. Investment Recommendation

Based on this comprehensive analysis, it is recommended to consider an investment in McPhy.

In the first place, McPhy's strong positioning in the renewable energy sector and, more specifically, in the electrolyser manufacturing market positions it well to capitalize on the growth opportunities within the industry. This strategic advantage enables McPhy to capture a significant market share in a rapidly expanding sector. Secondly, the DCF valuation reveals a fair share price of €13.49, significantly higher than the current market price of €8.43 (as of June 25, 2023). This implies an attractive potential upside, with an implied premium of 60% over the current market price. Additionally, the Monte Carlo simulation further strengthens the investment case. By highlighting the existence of positive outliers and higher share prices than the mean value, it indicates additional upside potential for investors.

Considering these factors, McPhy represents an excellent entry point for investors seeking long-term investment prospects, with a favorable risk-reward profile.

Despite the robustness of the analysis conducted, it is worth acknowledging its inherent limitations. Firstly, the analysis was conducted based on publicly available information and financial data, without the direct input from McPhy's management. The absence of insights from internal stakeholders may limit the analysis' ability to capture all potential future developments. Secondly, the analysis heavily relies on assumptions, both explicit and implicit, which may not fully materialize as expected. External factors, such as macroeconomic fluctuations, disruptions in the regulatory environment or changes in the competitive landscape, might introduce uncertainties and have an impact on McPhy's future financial performance. Therefore, it is fundamental to view the analysis as a useful tool to assist in decision-making and to identify potential opportunities in a high-growth industry, but it does not act as a definitive predictor of future performance.

4.7. Comparative Analysis of McPhy's Growth Potential

Building upon McPhy's projections, it is insightful to relate this analysis to the wider market and regression findings from Chapter 2 and Chapter 3, respectively.

To juxtapose the expected growth trajectory of McPhy against the expansion of the entire electrolyser market, the Company's installed electrolysis capacity should follow an annual growth rate of 16.85%, under the presumption of full capacity utilization. Consequently, to align with the sector-wide expansion, McPhy's installed capacity should increase from 193 MW in 2022 to 57.83 GW by 2050.

To support this ambitious goal, McPhy would need to drive substantial growth in several strategic areas. One such area is human capital. McPhy's workforce, forecasted to grow in line with the increase in revenues, would need to undergo a significant enlargement: a larger talent pool of engineers, technicians and administrative staff would be necessary to sustain the growth in business complexity. The second area is capital investment. In line with assumptions, sustained and considerable financial investment would be crucial to acquire additional electrolysis units and expand manufacturing facilities. The third area pertains to infrastructure augmentation. Indeed, McPhy would need to increase its PPE to contribute to its physical expansion, for instance by adopting technologically advanced systems or increasing existing premises.

While a growth trajectory of this scale may seem challenging, historical analogues suggest it is attainable. One example is the solar photovoltaic (PV) market. According to IRENA (2019), by the end of 2018, the global capacity of installed solar PV reached 480 GW, marking a CAGR of almost 43% since 2000. Like hydrogen, the solar PV industry has witnessed rapid growth driven by technological innovations and shifting societal priorities, offering an encouraging precedent for the trajectory anticipated for McPhy and the hydrogen sector as a whole.

Furthermore, examining McPhy's growth trajectory in the context of the panel data regression results unveils the crucial intersection of strategic initiatives and financial metrics.

In the first place, the necessity for market capitalization enhancement is mirrored in McPhy's ambitious expansion goals. Capturing new markets or diversifying product lines could broaden McPhy's customer base and elevate its market share, corroborating the high projected growth in revenues. This strategy aligns with the aggressive growth rate McPhy needs to match the sector-wide electrolyser market expansion.

Secondly, the importance of robust liquidity management is consistent with McPhy's strategic financial planning. As McPhy faces substantial investment demands for capacity expansion, workforce augmentation and technological innovations, efficient cash management and proficient working capital administration are pivotal. Encouragingly, both cash and capital structure metrics from 2023 onwards suggest that McPhy is well-equipped to navigate these challenges.

The third point of intersection involves profitability. A sound profitability profile entails not only revenue growth, but also diligent cost management. Projections suggest that McPhy is committed to efficiently managing and streamlining operating expenses, thereby ensuring that they remain under control while pursuing its sharp growth objectives.

However, one discrepancy lies in the role of M&A activities. The regression analysis identified M&A as a potential growth driver, but McPhy's valuation assumes no M&A activities until 2050, reflecting the Company's historical preference for organic growth. This distinction illustrates that, while M&A may be relevant for the sector at large, individual companies may choose to emphasize organic growth strategies instead.

This comparative analysis underscores the harmony between broader sector insights and McPhy's individual strategic approach, reinforcing the credibility of its forecasted growth trajectory.

Conclusion

In recent years, green hydrogen has captured widespread attention and sparked great interest among researchers and industry experts due to its potential as a sustainable energy vector. Green hydrogen's prospects to play a significant role in the future energy landscape have led to extensive research and elaboration on the topic.

The present study endeavored to make a valuable contribution to this growing body of knowledge by focusing on the electrolyser manufacturing market, an essential component for assessing the hydrogen industry's long-term viability and sustainability. Overall, the findings and implications of this research have the potential to inform strategic decision-making, drive innovation and foster the overall advancement of a renewable economy.

By forecasting the future demand for green hydrogen, installed electrolysis capacities and market size, this study aimed to understand the future projections of the industry and where it might be headed in the next decades. It found out that green hydrogen demand is expected to surge from 0.04 Mt to 21 Mt by 2030 and 411 by 2050, aligned with electrolysis capacities reaching 260 GW and 5,081 GW, respectively. This denotes an impressive market growth, underscored by a CAGR of 19.2% over 28 years, leading to a market valuation of $81.1 billion by 2050.

Based on this remarkable projected industry growth, the subsequent panel data regression analysis inspected the key drivers that will contribute to it. Companies would primarily rely on investments in innovative solutions, M&A activities, robust cash position management and a keen focus on cost control, coupled with strategic market expansion.

Furthermore, the valuation of McPhy presented a potential performance trajectory for a typical industry player, transitioning from consistent losses and negative profitability metrics (i.e., ROA, ROIC, ROE) to persistent profits and a steady market position.

Despite the compelling insights derived from this research, acknowledging its limitations is essential.

Primarily, both the market analysis and the DCF valuation heavily rely on assumptions that may not effectively materialize in the future. If these assumptions deviate from actual future outcomes, the future industry landscape could differ from the projected one, affecting the accuracy of the research's predictions.

Secondly, the industry's nascent state presents a unique challenge due to limited data availability. In fact, data scarcity could have impacted both the regression analysis and the compilation of secondary data concerning companies' projected electrolyser manufacturing capacities, limiting the depth of the results.

Moreover, the panel data methodology employs the last decade's historical data to draw conclusions on the dynamics at play. However, it does not ensure that the same trends will persist in the future. Indeed, as the industry evolves and new factors come into play, new variables and technologies might emerge that could disrupt the identified growth drivers.

For a more comprehensive understanding of the future trajectory of the green hydrogen industry, it would be valuable to complement this examination with investigations into different parts of the hydrogen supply chain. For instance, examining areas such as the usage of fuel cells to convert hydrogen into electricity or the deployment of green hydrogen in transportation systems could provide a broader perspective on the topic. This is, however, a task left for future studies.

In conclusion, recognizing the dynamic nature of the field, this study serves as an initial exploration, setting the stage for continuous examination as the industry unfolds and new breakthroughs emerge. It does not constitute a conclusion, but a steppingstone for future analyses and knowledge development within this captivating sector, potentially constituting a primer for the establishment of a new sustainable economy.

Appendix A: Electrolyser Manufacturers

	IDENTIFIER	COMPANY NAME	PRIVATE/PUBLIC	COUNTRY
1		1S1 Energy Inc	Private	USA
2		Angstrom Advanced Inc	Private	USA
3		Aquahydrex Inc	Private	USA
4	3407.T	Asahi Kasei Corp	Public	Japan
5	BE	Bloom Energy Corp	Public	USA
6		China Huadian Corporation Ltd	Private	China
7	600028.SS	China Petroleum & Chemical Corp	Public	China
8	CPH2.L	Clean Power Hydrogen PLC	Public	UK
9	CMI	Cummins Inc	Public	USA
10	DYA.TO	dynaCERT Inc	Public	Canada
11		Electrogenos Ltd	Private	UK
12	H2OG.F	Enapter AG	Public	Germany
13		Endua Pty Ltd	Private	Australia
14	RDUE.MI	Erredue SpA	Public	Italy
15	EFUEL.OL	Everfuel A/S	Public	Denmark
16		EvolOH Inc	Private	USA
17		Fortescue Future Industries	Private	Australia
18	FCEL.O	Fuelcell Energy Inc	Public	USA
19	HTOO.O	Fusion Fuel Green PLC	Public	Ireland
20	GREENH.CO	Green Hydrogen Systems A/S	Public	Denmark
21		Greenzo Energy Pvt Ltd	Private	India
22		H2V Product SAS	Private	France
23	7004.T	Hitachi Zosen Corp	Public	Japan
24	HNOI.PK	HNO International Inc	Public	USA
25	HYEG.PK	Hydrogen Engine Center Inc	Public	USA
26	HFI.ASE	Hydrogen Future Industries PLC	Public	UK
27		Hydrogen Optimized	Private	Canada
28		Hydrogen Utility Pty Ltd	Private	Australia
29	HYPRO.OL	Hydrogenpro ASA	Public	Norway
30		Hystar AS	Private	Norway
31	IMI.L	IMI PLC	Public	UK
32	ITM.L	ITM Power PLC	Public	UK
33	JEV.V	Jericho Energy Ventures Inc	Public	Canada
34		John Cockerill	Private	Belgium
35	601012.SS	LONGi Green Energy Technology Co Ltd	Public	China
36	MCPHY.PA	Mcphy Energy SA	Public	France
37	NEL.OL	Nel ASA	Public	Norway
38		Newtrace Limited Pvt	Private	India
39	NXH.V	Next Hydrogen Solutions Inc	Public	Canada
40		Ohmium International Inc	Private	USA
41	PLUG.O	Plug Power Inc	Public	USA

	IDENTIFIER	COMPANY NAME	PRIVATE/PUBLIC	COUNTRY
42	PCELL.ST	Powercell Sweden AB	Public	Sweden
43	ENR1n.DE	Siemens Energy AG	Public	Germany
44		Sunfire GmbH	Private	Germany
45		SunGreenH2 Pte Ltd	Private	Singapore
46	300274.Sz	Sungrow Power Supply Co Ltd	Public	China
47	HYSR.PK	SunHydrogen Inc	Public	USA
48		Supercritical Solutions Ltd	Private	UK
49		Teledyne Energy Systems Inc	Private	USA
50		thyssenkrupp nucera & AG Co KgaA	Private	Germany
51		Tianjin Mainland Hydrogen Equipment Co Ltd	Private	China
52		Topsoe A/S	Private	Denmark
53		Versogen Inc	Private	USA
54		VoltH2 BV	Private	The Netherlands

Table 8: Sample of Electrolyser Manufacturers

Appendix B: Green Hydrogen Demand Forecasts

AUTHOR	TITLE	PUBLICATION DATE	SCENARIO	Mt H_2 2030	Mt H_2 2050
bp	Energy Outlook 2023	2023	Accelerated	18	195
bp	Energy Outlook 2023	2023	Net Zero	30	299
Hydrogen Council	Hydrogen for Net-Zero: A Critical Cost-Competitive Energy Vector	2021	Lower Bound	20	400
Hydrogen Council	Hydrogen for Net-Zero: A Critical Cost-Competitive Energy Vector	2021	Upper Bound	30	550
IRENA	Global Renewables Outlook: Energy Transformation 2050	2020	PES	9	25
IRENA	Global Renewables Outlook: Energy Transformation 2050	2020	TES	25	160
Energy Transitions Commission	Making the Hydrogen Economy Possible: Accelerating Clean Hydrogen in an Electrified Economy	2021	Higher Blue Hydrogen	-	616
Energy Transitions Commission	Making the Hydrogen Economy Possible: Accelerating Clean Hydrogen in an Electrified Economy	2021	Medium Blue Hydrogen	-	680
Energy Transitions Commission	Making the Hydrogen Economy Possible: Accelerating Clean Hydrogen in an Electrified Economy	2021	Limited Blue Hydrogen	-	776
IEA	Global Hydrogen Review 2022	2022	STEPS	14	-
IEA	Global Hydrogen Review 2022	2022	APS	22	-
Average	**-**	**-**	**-**	**21**	**411**

Table 9: Summary of Green Hydrogen Demand Forecasts

For a better understanding of these green hydrogen demand forecasts, the different scenarios on which these publications base their estimates are hereby explained.

bp (2023) constructs three scenarios to predict a wide range of outcomes for the global energy system until 2050: Accelerated, Net Zero and New Momentum. However, hydrogen forecasts are developed solely for the Accelerated and the Net Zero scenarios. Both scenarios explore what elements of the energy system would change in case the world undertook a collective and decisive action to reduce CO_2 equivalent emissions[7] (CO_2e) by 75% and 95% by 2050 (relative to 2019 levels), respectively in the Accelerated and the Net Zero scenarios. Additionally, Net Zero incorporates a shift in society's preferences and attitudes, which promotes increases in energy

[7] A CO_2 equivalent is a unit of measurement used to standardize the effects of various greenhouse gases. It refers to the amount of CO_2 emissions that possess the same global warming potential as one metric ton of another greenhouse gas.

efficiency and a wider usage of clean energy.

The Hydrogen Council (2021a), whose report is written in collaboration with McKinsey & Company, does not specify clear-cut scenarios for green hydrogen demand. Conversely, it simply provides a range for these projections, with a lower bound and an upper bound, corresponding to the most conservative and the least conservative outlooks, respectively.

IRENA's paper (2020) presents several scenarios and their related outcomes, but only two of them relate to green hydrogen: the Planned Energy Scenario (PES) and the Transforming Energy Scenario (TES). PES provides a future perspective on the energy system grounded on countries' current energy plans, as well as on other anticipated policies or targets. TES is a more ambitious, yet realistic, pathway: it is rooted on the belief that a large use of renewable energy sources and an improved energy efficiency could lead towards limiting the rise in global temperature to well below 2°C and near 1.5°C, in line with the Paris Agreement's objective.

According to the Energy Transitions Commission's report (2021), the deployment of green hydrogen production depends on the ramp up of blue hydrogen. In this regard, there exist three different pathways for green hydrogen, deeply related to the future of blue hydrogen: when blue hydrogen is expected to play a limited role in the energy system, then green hydrogen's role improves; vice versa, when blue hydrogen is foreseen to cover a great share of energy supply, then green hydrogen's forecasted production is lower.

IEA (2022) hinges its hydrogen review on two possible scenarios: the Stated Policies Scenario (STEPS) and the Announced Pledges Scenario (APS). The former assesses the hydrogen economy based on the policies that are currently in place, together with those that have already been announced by governments worldwide. Contrariwise, the latter assumes that ambitious and concrete climate pledges to stimulate the growth of the green hydrogen market will be delivered in full and on time, thus presenting a more optimistic outlook.

Appendix C: Required Installed Electrolysis Capacities

PARAMETER	VALUE	UNIT
Electrolysis efficiency	5	kWh/Nm^3
Hydrogen standard density	0.08988 0.00008988	kg/Nm^3 metric tons
Hydrogen produced with 1 kWh	0.2 0.017976 0.000017976	Nm^3 kg metric tons
Hydrogen produced with 1 GWh	200,000 17,976 17.976	Nm^3 kg metric tons
Hydrogen projection 2030	21 21,000,000	Mt metric tons
Hydrogen projection 2050	411 411,000,000	Mt metric tons
Electricity requirement 2030	1,168,224.30	GWh
Electricity requirement 2050	22,863818.42	GWh

Table 10: Electricity Requirements for Hydrogen Generation

ENERGY SOURCE	OPERATING HOURS (h/a)	REQUIRED INSTALLED CAPACITY TO ACHIEVE 21 Mt OF H_2 (GW)	REQUIRED INSTALLED CAPACITY TO ACHIEVE 411 Mt OF H_2 (GW)
Photovoltaic	1000	1,168	22,864
Onshore wind	2000	584	11,432
Offshore wind	4500	260	5,081
Grid-based electricity	8500	137	2,690

Table 11: Required Installed Electrolysis Capacities by 2030 and 2050

Two key assumptions lie behind the estimates concerning the needed installed electrolysis capacities:

1. An electrolysis efficiency of 5 kWh/Nm^3, which means that an electrolyser requires 5 kilowatt-hours (kWh) of electricity to produce 1 normal cubic meter (Nm^3) of hydrogen.
2. A standard density of 0.08988 kg/Nm^3 for the mass conversion of hydrogen, which means that 1 Nm^3 of hydrogen weighs 0.08988 kilograms (kg). In other terms, 1 Nm^3 of hydrogen weighs 0.00008988 metric tons.

From these figures, it is possible to compute that 1 kWh of electricity produces $0.2\,Nm^3 *$

$0.08988\ kg/Nm^3 = 0.017976\ kg$ of hydrogen, that is 0.000017976 metric tons of hydrogen. Since 1 gigawatt-hour (GWh) is equivalent to 1,000,000 kWh, 1 GWh of electricity will produce $1{,}000{,}000 * 0.017976\ kg = 17{,}976\ kg$ of hydrogen, that is 17.976 metric tons of hydrogen.

Therefore, to produce 21,000,000 metric tons (21 million tonnes or Mt) of hydrogen, there is the need for $\frac{21{,}000{,}000\ metric\ tons}{17.976\ metric\ tons/GWh} = 1{,}168{,}224.30\ GWh$ of electricity. Instead, to produce 411,000,000 metric tons (411 Mt) of hydrogen, $\frac{411{,}000{,}000\ metric\ tons}{17.976\ metric\ tons/GWh} = 22{,}863{,}818.42\ GWh$ of electricity are needed.

At this point, there are all the elements essential to compute the installed capacities in GW for the different operating hours. Starting from the instance of 21 Mt of hydrogen production:

- For ~1000 operating hours: $\frac{1{,}168{,}224.30\ GWh}{1000\ hours} = 1{,}168.22\ GW$
- For ~2000 operating hours: $\frac{1{,}168{,}224.30\ GWh}{2000\ hours} = 584.11\ GW$
- For ~4500 operating hours: $\frac{1{,}168{,}224.30\ GWh}{4500\ hours} = 259.61\ GW$
- For ~8500 operating hours: $\frac{1{,}168{,}224.30\ GWh}{8500\ hours} = 137.44\ GW$

On the other hand, for the instance of 411 Mt of hydrogen production:

- For ~1000 operating hours: $\frac{22{,}863{,}818.42\ GWh}{1000\ hours} = 22{,}863.82\ GW$
- For ~2000 operating hours: $\frac{22{,}863{,}818.42\ GWh}{2000\ hours} = 11{,}431.91\ GW$
- For ~4500 operating hours: $\frac{22{,}863{,}818.42\ GWh}{4500\ hours} = 5{,}080.85\ GW$
- For ~8500 operating hours: $\frac{22{,}863{,}818.42\ GWh}{8500\ hours} = 2{,}689.86\ GW$

If ~4500 operating hours are thought to be the most plausible scenario in the hydrogen economy, then the required installed electrolysis capacities are equal to 259.61 GW and 5,080.85 GW for 2030 and 2050, respectively.

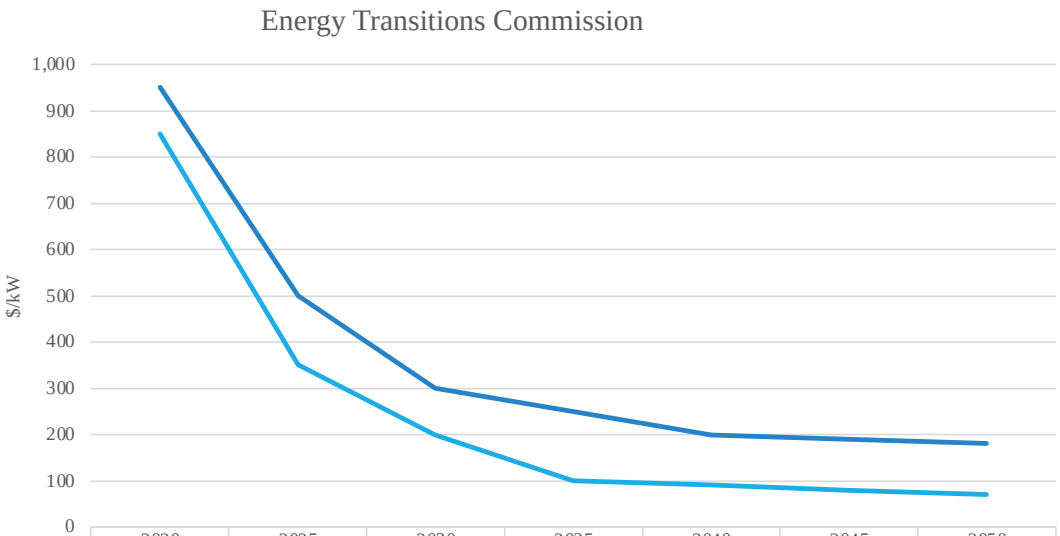
Appendix D: Planned Expansion Programs of Electrolyser Manufacturers

COMPANY NAME	TECHNOLOGY	FUTURE PROJECTION (MW)	SOURCE
1S1 Energy Inc	PEM	300	(Johnstone, 2022)
Angstrom Advanced Inc	PEM	100	(Hydrogen Central, 2022)
Aquahydrex Inc	Proprietary	-	-
Asahi Kasei Corp	AWE	100	(Asahi Kasei Corp., 2022)
Bloom Energy Corp	SOE	2,700	(Bloom Energy, 2022) (Bloom Energy, 2021)
China Huadian Corporation Ltd	AWE / PEM	-	-
China Petroleum & Chemical Corp	AWE / PEM	365	(Adnokronos, 2023) (Parkes, 2022b)
Clean Power Hydrogen PLC	Proprietary	2,002	(Clean Power Hydrogen, 2022) (Ellis, 2022)
Cummins Inc	PEM	4,340	(Adler, 2022) (Cummins, 2022a) (Cummins, 2022b) (Cummins, 2022c) (Cummins, 2021) (Mishra, 2022) (Sokic, 2022a)
dynaCERT Inc	AEM	-	-
Electrogenos Ltd	AWE	-	-
Enapter AG	AEM	335	(Collins, 2022a) (Enapter, 2023) (Shumkov, 2023)
Endua Pty Ltd	PEM	0.1	(Peacock, 2023)
Erredue SpA	AWE / PEM	-	-
Everfuel A/S	AWE	3,300	(Everfuel, 2021)
EvolOH Inc	Proprietary	18,750	(EvolOH, 2023)
Fortescue Future Industries	PEM	2,000	(EnergyTech Staff, 2022a) (Parkes, 2022a)
Fuelcell Energy Inc	SOE	1.25	(FuelCell Energy, 2022)
Fusion Fuel Green PLC	Proprietary	4,726	(EnergyTech Staff, 2022b) (FuelCellWorks, 2021a) (Fusion Fuel, 2021) (Invest in Spain, 2023)
Green Hydrogen Systems A/S	Proprietary	1,424	(FuelCellWorks, 2021b) (Green Hydrogen Systems, 2023) (Green Hydrogen Systems, 2021)
Greenzo Energy Pvt Ltd	AEM / PEM	1,800	(BL Ahmedabad Bureau, 2023) (Vora, 2022)
H2V Product SAS	PEM	3,000	(H2V, 2023)
Hitachi Zosen Corp	PEM	-	-
HNO International Inc	PEM	-	-
Hydrogen Engine Center Inc	PEM	-	-
Hydrogen Future Industries PLC	Proprietary	-	-
Hydrogen Optimized	Proprietary	10,830	(Casey, 2023) (Hydrogen Optimized, 2022) (Tisheva, 2022)
Hydrogen Utility Pty Ltd	Proprietary	4,500	(Brown, 2020) (RWE, 2021)
Hystar AS	PEM	1	(Hystar, 2022)

COMPANY NAME	TECHNOLOGY	FUTURE PROJECTION (MW)	SOURCE
IMI PLC	PEM	100	Conversation with Company Representatives
ITM Power PLC	PEM	5,000	(ITM Power, 2022)
Jericho Energy Ventures Inc	PEM /Proprietary	-	-
John Cockerill	AWE	30,000	(John Cockerill, 2023) (Lea, 2022)
LONGi Green Energy Technology Co Ltd	AWE	5,000	(LONGi, 2022)
Mcphy Energy SA	AWE	1,513	(McPhy Energy, 2023b) (McPhy Energy, 2021) (McPhy Energy, 2020)
Nel ASA	AWE / PEM	6,120	(Hydrogen Central, 2023) (Nel, 2023) (Nel, 2022)
Newtrace Limited Pvt	Proprietary	-	-
Next Hydrogen Solutions Inc	AWE / PEM	60	(Sokic, 2022b)
Ohmium International Inc	PEM	4,100	(Cepsa, 2022) (Gupta, 2022) (Mishra, 2023) (Ohmium, 2021) (Shetty, 2023)
Plug Power Inc	PEM	8,275	(Donaldson, 2023) (EnergyTech Staff, 2023a) (Holger, 2022) (Power Technology, 2021) (Plug Power, 2022a) (Plug Power, 2022b)
Powercell Sweden AB	AWE / PEM	-	-
Siemens Energy AG	PEM	6,077.5	(Collins, 2022b) (Habibic, 2023a) (Siemens, 2022) (Siemens Energy, 2022a) (Siemens Energy, 2022b) (Schrapp, 2023)
Sunfire GmbH	AWE / SOE	2,393.32	(Eckert, 2021) (EnergyTech Staff, 2023b) (Matalucci, 2023) (Salzgitter, 2020) (Sunfire, 2022) (Sunfire, 2021a) (Sunfire, 2021b)
SunGreenH2 Pte Ltd	Proprietary	-	-
Sungrow Power Supply Co Ltd	AWE / PEM	2,200	(Tisheva, 2023)
SunHydrogen Inc	Proprietary	-	-
Supercritical Solutions Ltd	Proprietary	-	-
Teledyne Energy Systems Inc	AWE	-	-
thyssenkrupp nucera & AG Co KgaA	AWE	8,140	(H2 Green Steel, 2023) (Ponikwar, 2022) (thyssenkrupp, 2023a) (thyssenkrupp, 2023b)
Tianjin Mainland Hydrogen Equipment Co Ltd	AWE	300	(HydrogenPro, 2021)
Topsoe A/S	SOE	9,000	(Atchison, 2022) (Topsoe, 2022)
Versogen Inc	AEM	-	-
VoltH2 BV	AWE / PEM	610	(Bailey, 2020) (Biogradlija, 2023) (Habibic, 2023b) (VoltH2, 2023a) (VoltH2, 2023b)
Total	**-**	**154,683.17**	**-**

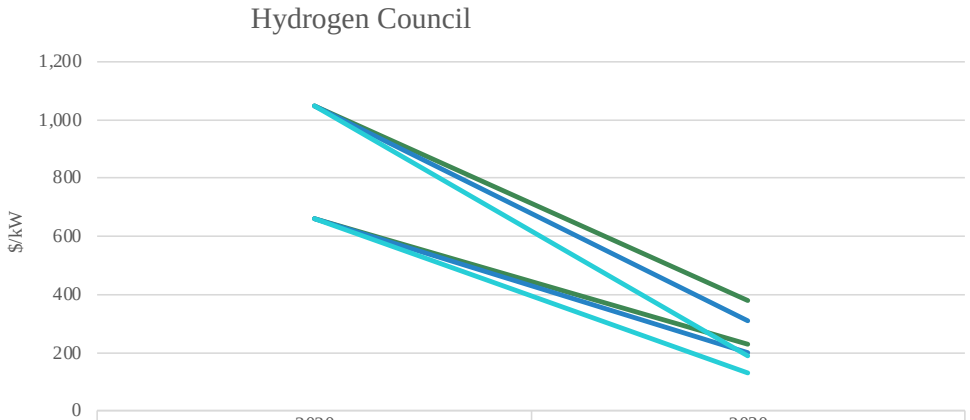
Table 12: Summary of Future Planned Electrolyser Capacities

Appendix E: Electrolyser System Costs by Source



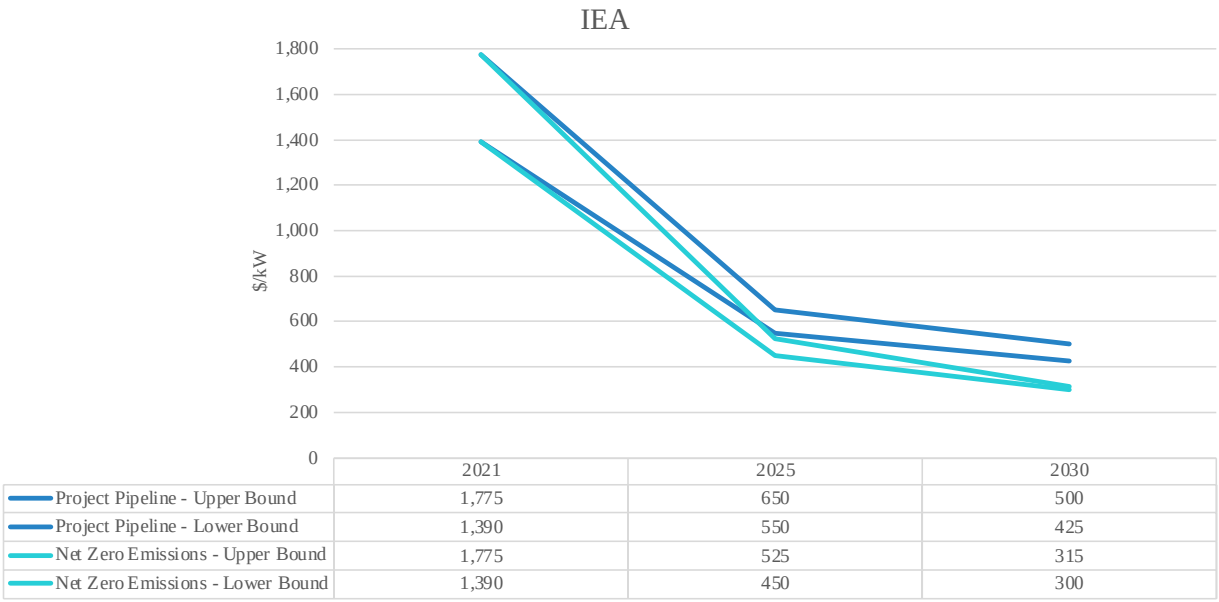
	2020	2025	2030	2035	2040	2045	2050
Conservative Scenario	950	500	300	250	200	190	180
Optimistic Scenario	850	350	200	100	90	80	70

Figure 13: Electrolyser CAPEX Evolution by Energy Transitions Commission (2021)



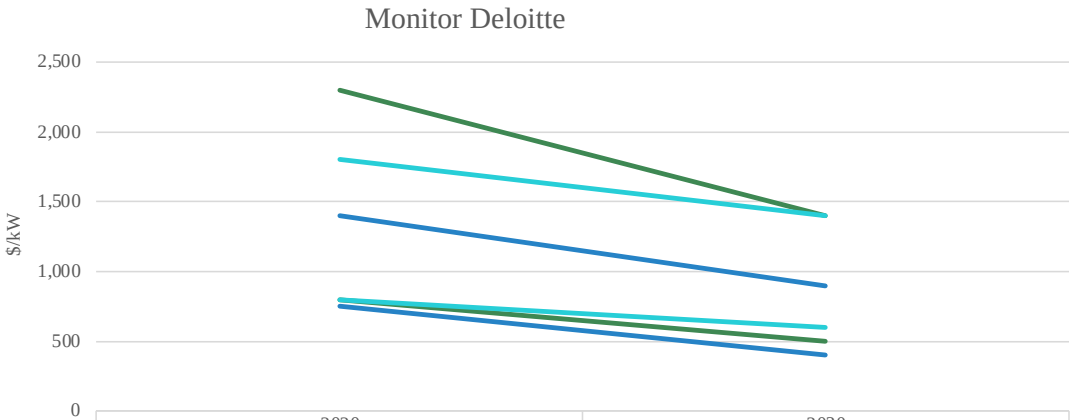
	2020	2030
12% Learning Rate - Upper Bound	1,050	380
12% Learning Rate - Lower Bound	660	230
15% Learning Rate - Upper Bound	1,050	310
15% Learning Rate - Lower Bound	660	200
20% Learning Rate - Upper Bound	1,050	190
20% Learning Rate - Lower Bound	660	130

Figure 14: Electrolyser CAPEX Evolution by Hydrogen Council (2021b)



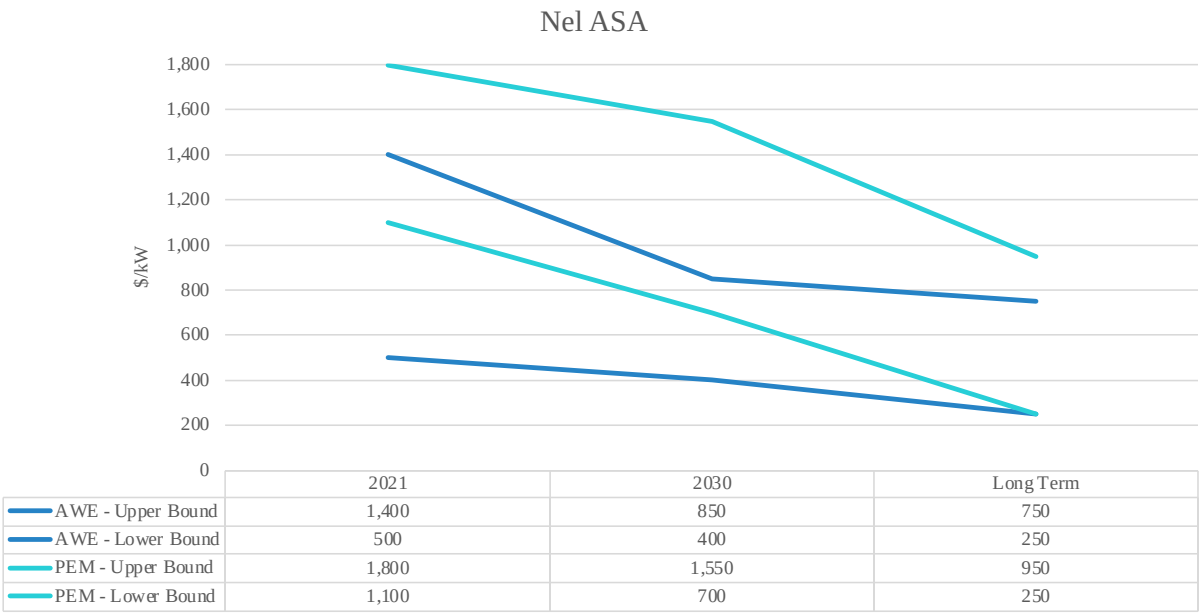
	2021	2025	2030
Project Pipeline - Upper Bound	1,775	650	500
Project Pipeline - Lower Bound	1,390	550	425
Net Zero Emissions - Upper Bound	1,775	525	315
Net Zero Emissions - Lower Bound	1,390	450	300

Figure 15: Electrolyser CAPEX Evolution by IEA (2022)



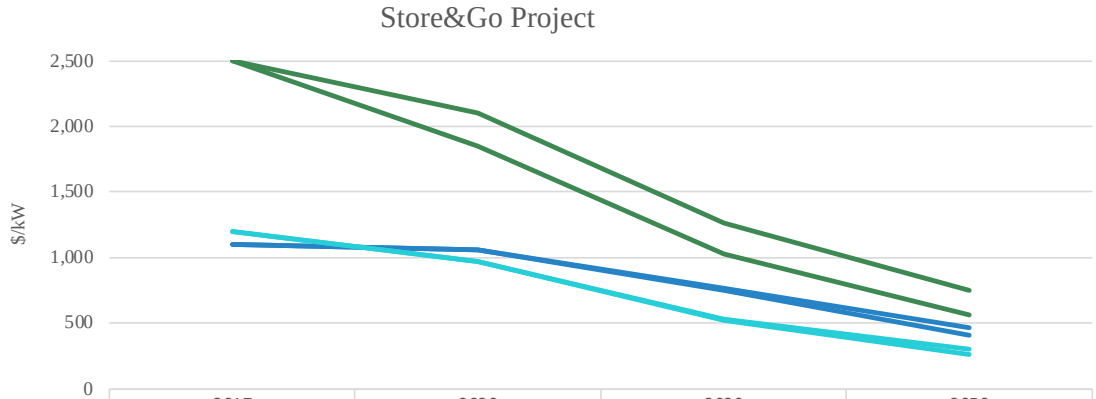
	2020	2030
SOE - Upper Bound	2,300	1,400
SOE - Lower Bound	800	500
AWE - Upper Bound	1,400	900
AWE - Lower Bound	750	400
PEM - Upper Bound	1,800	1,400
PEM - Lower Bound	800	600

Figure 16: Electrolyser CAPEX Evolution by Monitor Deloitte (2021)



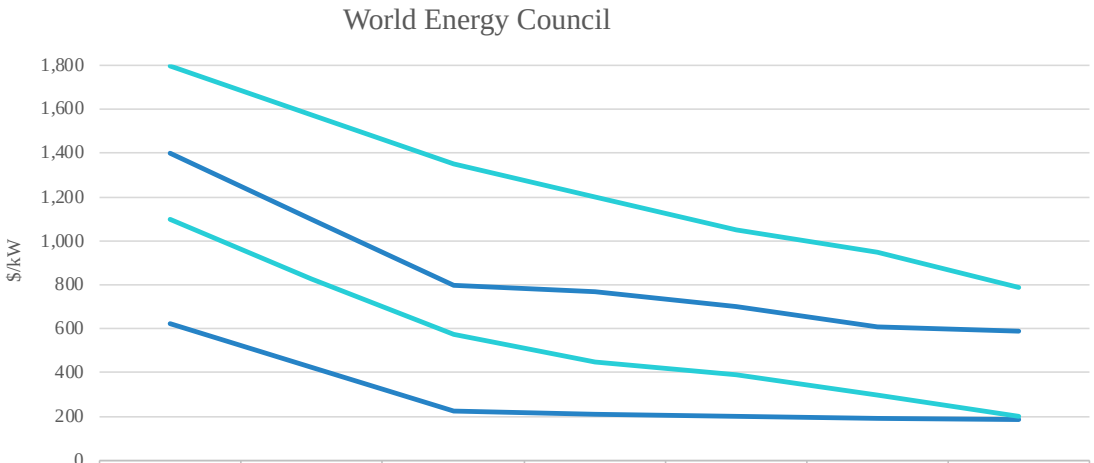
	2021	2030	Long Term
AWE - Upper Bound	1,400	850	750
AWE - Lower Bound	500	400	250
PEM - Upper Bound	1,800	1,550	950
PEM - Lower Bound	1,100	700	250

Figure 17: Electrolyser CAPEX Evolution by Nel ASA (2021)



	2017	2020	2030	2050
SOE - Upper Bound	2,500	2,100	1,266	751
SOE - Lower Bound	2,500	1,850	1,031	560
AWE - Upper Bound	1,100	1,059	767	464
AWE - Lower Bound	1,100	1,058	754	408
PEM - Upper Bound	1,200	973	532	303
PEM - Lower Bound	1,200	971	522	265

Figure 18: Electrolyser CAPEX Evolution by Store&Go Project (2018)



	2020	2025	2030	2035	2040	2045	2050
AWE - Upper Bound	1,400	1,100	800	770	700	610	590
AWE - Lower Bound	625	425	225	210	200	190	185
PEM - Upper Bound	1,800	1,575	1,350	1,200	1,050	950	790
PEM - Lower Bound	1,100	825	575	450	390	300	200

Figure 19: Electrolyser CAPEX Evolution by World Energy Council (2021)

Appendix F: Panel Data Regression Models and Diagnostic Tests

Panel data models benefit from a series of advantages compared to time-series and cross-sectional analyses. In fact, they allow to address differences that may exist between individual entities being analyzed over time. This ensures to accurately estimate the effects of time-varying factors and prevents obtaining results biased by time-invariant differences between individual units. Moreover, by tracking how variables change within units over time, as well as across units at a given point in time, panel data produce results with a higher explanatory power, more variability, more degrees of freedom, a higher efficiency, and less collinearity among variables. In addition, while cross-sectional data run the risk of masking changes that occur over time, panel data provide a more dynamic and nuanced understanding of trend adjustments over periods. The last advantage stems from how panel data allow for the construction of more complicated models than pure cross-sectional or time-series data (Baltagi, 2021).

In formula terms, a panel data regression is characterized by the double subscript it has on its variables. Following Baltagi's notation (2021), a general panel data regression model can be outlined as follows:

$$y_{it} = \alpha + X'_{it}\beta + \upsilon_{it} \qquad i = 1, \dots, N \qquad t = 1, \dots, T$$

where:

- y_{it} is the outcome variable of interest
- i denotes the cross-sectional dimension (i.e., companies)
- t denotes the time-series dimension (i.e., years)
- α is a scalar
- β is K x 1
- X_{it} is the it^{th} observation on K explanatory variables

- v_{it} is the error term

Panel data applications may utilize a one-way error component model for the disturbances or a two-way error component model. In the case of a two-way error component model, the error term v_{it} can be specified as follows:

$$v_{it} = \mu_i + \lambda_i + \nu_{it}$$

where:

- μ_i represents the unobservable individual specific effect not captured by the regression
- λ_i represents the unobservable time effect not captured by the regression
- ν_{it} represents the usual remainder disturbance

Conversely, a one-way error component regression model includes only one unobservable effect, that is μ_i. Therefore, in a one-way error component regression model, $\lambda_i = 0$ and the error term v_{it} can be defined as follows:

$$v_{it} = \mu_i + \nu_{it}$$

where:

- μ_i represents the unobservable individual specific effect not captured by the regression
- ν_{it} represents the usual remainder disturbance

While the pooled OLS model has already been presented, the FE and the RE models will be outlined herein.

According to the FE model, entities possess individual characteristics which may or may not influence predictor variables. Since these individual characteristics are not random, we need to control for them. By doing so, the effect of the regressors will not be affected by those fixed characteristics. The FE model can be made explicit through the following expression:

$$y_{it} = (\alpha + \mu_i) + X'_{it}\beta + \nu_{it}$$

where:

- μ_i is a fixed effect specific to an entity that is not included in the regression
- v_{it} is the idiosyncratic error and is independent and identically distributed, $v_{it} \sim IID(0, \sigma_v^2)$

As stated above, the fixed effects μ_i are correlated with the regressors X'_{it}, but they remain uncorrelated with v_{it}. Hence, this allows for a limited form of endogeneity[8] (Torres-Reyna, 2007). By including the fixed effect into the intercept, the FE model examines individual differences in intercepts and considers heterogeneity across cross-sections. Instead, it assumes constant slopes and error variances.

The two estimation methods commonly used for this model are the Least Squares Dummy Variables (LSDV) and the within-effect regression. The LSDV method involves the use of dummy variables, which increase in number as the sample size increases. For very large samples, however, the high number of dummy variables can pose computational challenges. On the other hand, the within-effect regression method uses deviations from group or period means instead of dummy variables. While addressing computational issues, this approach eliminates time-invariant variables that do not vary within each entity. Nevertheless, both methods yield identical estimates for non-dummy independent variables, ensuring consistent and comparable results.

The FE model is tested through an F-test, included in the regression output, where the null hypothesis is that all the dummy parameters are zero. Vice versa, the alternative hypothesis is that at least one dummy parameter is different from zero. These two hypotheses can be summarized as follows:

$$H_0: \mu_i = 0$$

$$H_1: \mu_i \neq 0$$

[8] In a regression model, in opposition to exogeneity, endogeneity refers to the situation in which a predictor is correlated to the error term.

If the null hypothesis is rejected, then there is enough evidence to state that there is a significant fixed effect in the FE model. Therefore, the FE model works better than the pooled OLS.

In the RE model, unlike the FE model, the variation across entities is considered to be random and uncorrelated with the predictor variables. If there are reasons to believe that differences across entities have an influence on the dependent variable, but are not correlated with the independent variables, then the RE model might be the most appropriate one. The RE model can be made explicit through the following expression:

$$y_{it} = \alpha + X'_{it}\beta + (\mu_i + \nu_{it})$$

where:

- μ_i is a random effect specific to an entity that is not included in the regression
- ν_{it} is the idiosyncratic error and is independent and identically distributed, $\nu_{it} \sim IID(0, \sigma_\nu^2)$

In opposition to the FE model, the individual effects μ_i are not correlated with any regressor and are included in the error component rather than in the intercept. Therefore, while intercepts and slopes are constant, differences among individuals or time periods lie in their individual specific errors. By assuming that an entity's error term is not correlated with the predictors, time-invariant variables can play a role as explanatory variables in the model.

When estimating an RE model, the choice of the estimation method depends on the covariance structure of the errors. If the covariance structure is known, the appropriate estimation method is the random-effects Generalized Least Squares (GLS) regression. In this method, the errors are assumed to follow a specific covariance pattern. However, when the covariance structure of the errors is unknown, alternative estimation methods are used, like Feasible Generalized Least Squares (FGLS) or Estimated Generalized Least Squares (EGLS).

In the RE model, the hypothesis test is a Breusch-Pagan Lagrange Multiplier (LM) test, which

is performed apart from the actual regression. By using an LM statistic that follows the chi-squared distribution with one degree of freedom, its purpose is to examine if individual specific variant components are jointly equal to zero, which is indeed the null hypothesis:

$$H_0: \mu_i = 0$$

$$H_1: \mu_i \neq 0$$

If the null hypothesis is rejected, then there is evidence of a significant random effect (i.e., there is a significant difference across units) and the RE model is better able to manage heterogeneity compared to pooled OLS. Vice versa, if no panel effect is detected in the data, then pooled OLS is the correct model to apply (Breusch & Pagan, 1980).

Overall, the advantage of the RE model over the FE model is that the former reduces the number of parameters to be estimated, but it produces biased estimates when the specific random effect is correlated with the independent variables (Greene, 2012). Table 13 summarizes the major differences between the FE and RE models.

CHARACTERISTIC	FIXED EFFECTS MODEL	RANDOM EFFECTS MODEL
Expression	$y_{it} = (\alpha + \mu_i) + X'_{it}\beta + \nu_{it}$	$y_{it} = \alpha + X'_{it}\beta + (\mu_i + \nu_{it})$
Assumption	Individual effects are correlated with regressors	Individual effects are not correlated with regressors
Intercepts	Varying	Constant
Slopes	Constant	Constant
Error Variances	Constant	Varying
Estimation Method	LSDV / Within-Estimation	GLS / FGLS / EGLS
Hypothesis Test	F-Test	Breusch-Pagan Lagrange Multiplier Test

Table 13: Fixed Effects versus Random Effects Models

Having outlined the differences between the FE and the RE models, the Hausman test is used to determine which of the two is more appropriate in a panel data analysis. If the FE model is more appropriate, then individual effects are correlated with regressors; in contrast, if the RE model is more appropriate, then individual effects are uncorrelated with regressors. Therefore, the Hausman

test substantially determines whether there exists a correlation between individual effects and regressors by comparing the estimates of the two models.

The Hausman statistic, constructed as a function of the difference between the estimated coefficients in the FE and RE models, follows a chi-squared distribution with degrees of freedom equal to the number of potentially endogenous regressors (Hausman, 1978). The null hypothesis of the test is:

$$H_0: corr(\mu_i, X'_{it}) = 0$$

whereas the alternative hypothesis is:

$$H_1: corr(\mu_i, X'_{it}) \neq 0$$

Therefore, if the test statistic is statistically significant, the null hypothesis of no correlation is rejected, and the FE model is preferred. Conversely, if the test statistic is not statistically significant, the null hypothesis cannot be rejected, and the RE model is more appropriate (Park, 2011).

A further diagnostic tests exists, specific for an FE model. It tries to assess if time-fixed effects are needed in the form of year dummies. These effects allow to eliminate any bias arising from variables that change over time, but are constant across entities. This analysis can be conducted by simply performing a joint test to see if the coefficients for all the years are jointly equal to zero. The null and the alternative hypotheses are as follows:

$$H_0: Coefficients\ for\ the\ years\ are\ jointly\ equal\ to\ 0$$

$$H_1: Coefficients\ for\ the\ years\ are\ not\ jointly\ equal\ to\ 0$$

If the null hypothesis is not rejected, then the model works as it is, without time-fixed effects. On the contrary, if the null hypothesis is rejected, time-fixed effects must be included in the model (Torres-Reyna, 2007).

Appendix G: Descriptive Statistics and Correlation Matrix from Regression Models

Table 14 presents the output provided by the command "xtdescribe", typically shortened into "xtdes", which "describes the cross-sectional and time-series aspects of the data in memory" (StataCorp, 2021b). It elucidates that there are 29 electrolyser manufacturers and that the ID code which identifies each of them ranges from 1 to 29. In addition, the number of years over which the companies are observed is 10, with the periodicity being one year ($Delta(Year) = 1\ unit$). A brief comment discloses that the combination of the two variables "ID" and "Year" uniquely identifies each observation in the sample. Lastly, the distribution of T_i and the participation pattern confirm that the data set is effectively a balanced panel data set instead of an unbalanced one. Indeed, all entities (cross-sectional data) are observed in all time periods (time-series data).

ID: 1, 2, ..., 29 n = 29
Year: 2013, 2014, ..., 2022 T = 10
Delta(Year) = 1 year
Span(Year) = 10 periods
(ID*Year uniquely identifies each observation)

Distribution of T_i:	min	5%	25%	50%	75%	95%	max
	10	10	10	10	10	10	10

Freq.	Percent	Cum.	Pattern
29	100.00	100.00	1111111111
29	100.00		XXXXXXXXXX

Table 14: Output of "xtdescribe"

Table 15 and Table 16 report, respectively, descriptive statistics for dependent and independent variables. The command "xtsummarize", usually shortened into "xtsum", reports means, "overall", "between" and "within" standard deviations, minimums, maximums, and the number of observations for numeric variables in the data set. "Between" statistics assess the cross-sectional aspect of the data (i.e., between separate panel units), "within" statistics look at the time-series aspect (i.e., within panel units) and "overall" statistics consider both aspects. "Overall" and "within" figures are computed over $N = n * T-bar$ company-year combinations of data, where

$T-bar$ is the average number of years a company was observed, while "between" figures are computed over n companies (StataCorp, 2021b).

Variable		Mean	SD	Min	Max	Observations	
GPM	overall	-0.396	2.891	-23.902	0.994	N =	188
	between		2.420	-11.406	0.555	n =	26
	within		2.427	-20.491	10.022	T-bar =	7.231
TOBIN	overall	7.310	21.514	0.138	188.691	N =	191
	between		14.663	0.253	66.137	n =	29
	within		15.444	-56.781	129.865	T-bar =	6.586

Table 15: Output of "xtsummarize" for Dependent Variables

Variable		Mean	SD	Min	Max	Observations	
MKTCAP	overall	8682.280	19982.180	0.234	10874.400	N =	192
	between		16699.400	1.722	85540.340	n =	29
	within		7015.549	-11516	60568.630	T-bar =	6.621
AGE	overall	23.794	25.863	1	102	N =	247
	between		26.138	1.500	98.500	n =	29
	within		2.751	19.294	28.294	T-bar =	8.517
DA	overall	0.490	1.338	0.003	9.057	N =	197
	between		0.968	0.008	5.265	n =	28
	within		0.812	-4.760	4.283	T-bar =	7.036
BETA	overall	1.062	1.023	-3.560	4.560	N =	145
	between		0.877	-2.065	2.582	n =	25
	within		0.770	-2.484	4.584	T-bar =	5.8
CAPEX	overall	866.050	3449.213	0.004	22467.640	N =	196
	between		3138.072	0.014	16959.690	n =	29
	within		845.757	-5587.904	6374.001	T-bar =	6.759
RD	overall	177.448	333.859	0.054	1278	N =	136
	between		336.832	0.086	1180.127	n =	19
	within		89.447	-278.752	706.248	T-bar =	7.158
GSALES	overall	0.912	5.529	-0.769	70.852	N =	175
	between		1.712	-0.720	7.958	n =	25
	within		5.210	-6.973	63.806	T-bar =	7
CASH	overall	2.204	3.830	0.003	24.713	N =	213
	between		3.416	0.038	13.970	n =	29
	within		2.786	-7.541	18.784	T-bar =	7.345
PE	overall	21.918	21.077	0.971	135	N =	79
	between		12.817	1.447	45.845	n =	14
	within		16.344	-7.999	111.073	T-bar =	5.643
MA	overall	0.286	0.453	0	1	N =	290
	between		0.316	0	0.900	n =	29
	within		0.329	-0.614	1.186	T-bar =	10

Table 16: Output of "xtsummarize" for Independent Variables

Table 17 presents the pairwise correlation coefficients between all the pairs of independent variables in the panel data set. Correlation coefficients range between -1 and +1, where -1 indicates a perfect negative correlation, 0 represents no correlation and +1 indicates a perfect positive

correlation. The closer the coefficient is to -1 or +1, the stronger the relationship between the variables. The p-value for each entry is shown in round brackets, below the respective correlation coefficient, with one, two or three stars representing a significance level of 0.1, 0.05 and 0.01, respectively.

Most correlation coefficients are low and close to 0, indicating weak or no linear relationships between the variables. However, there are two exceptions. First, the positive correlation coefficient between CAPEX and MKTCAP (0.811) implies that companies making substantial investments to expand their operations tend to have higher market capitalizations. Second, the positive correlation coefficient between RD and CAPEX (0.871) is logical since they are both metrics used to quantify the number of investments made in operational activities. It is important to note that correlation coefficients above 0.7 (or -0.7) are often indicative of multicollinearity issues. However, in this study, a VIF analysis was considered the most appropriate method to address multicollinearity in the sample, providing assurance that it was effectively dealt with.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) MKTCAP	1.000									
(2) AGE	0.120	1.000								
	(0.104)									
(3) DA	-0.102	-0.147*	1.000							
	(0.183)	(0.047)								
(4) BETA	-0.008	0.096	-0.423*	1.000						
	(0.929)	(0.252)	(0.000)							
(5) CAPEX	0.811*	-0.013	-0.054	-0.063	1.000					
	(0.000)	(0.860)	(0.470)	(0.466)						
(6) RD	0.538*	0.579*	-0.155*	-0.007	0.871*	1.000				
	(0.000)	(0.000)	(0.082)	(0.948)	(0.000)					
(7) GSALES	-0.063	-0.087	-0.066	-0.068	-0.086	-0.171*	1.000			
	(0.429)	(0.258)	(0.403)	(0.435)	(0.269)	(0.068)				
(8) CASH	-0.193*	-0.271*	-0.157*	0.130	-0.128*	-0.238*	0.080	1.000		
	(0.008)	(0.000)	(0.029)	(0.119)	(0.076)	(0.005)	(0.295)			
(9) PE	-0.072	-0.179	-0.168	0.237*	-0.210*	-0.270*	0.427*	0.001	1.000	
	(0.533)	(0.120)	(0.143)	(0.064)	(0.071)	(0.046)	(0.000)	(0.990)		
(10) MA	0.358*	0.497*	-0.173*	0.032	0.270*	0.323*	0.068	-0.153*	-0.022	1.000
	(0.000)	(0.000)	(0.015)	(0.706)	(0.000)	(0.000)	(0.372)	(0.026)	(0.844)	

**** p<0.01, ** p<0.05, * p<0.1*

Table 17: Correlation Matrix

Appendix H: Stata Do-File

```
*Set the command interpreter to the version number
version 17

*Clear the data in memory
clear all

*Create an rtf file which will be filled with summary statistics and tables of
estimation results
ssc install asdoc
asdoc sum

*Import data
import excel "C:\Users\MalvinaMoretti.LAPTOP-THINKPAD\Documents\Nova
SBE\Profitability Drivers\Analysis of Profitability Drivers.xlsx", sheet("Data for
Stata") firstrow

*Reshape data into longitudinal format
reshape long GPM TOBIN SALES ASSETS EMPLOYEES MKTCAP AGE DA DE BETA CAPEX RD GSALES
GASSETS CURRENT QUICK CASH PE MA, i(ID) j(Year)

*Declare data as panel data
xtset ID Year, yearly

*Deal with outliers on GPM
ssc install winsor2
winsor2 GPM, replace cut(1 99) trim
graph box GPM, name(One) title("Box Plot GPM")
graph export BoxPlot_GPM.png

*Deal with outliers on TOBIN
winsor2 TOBIN, replace cut(1 99) trim
graph box TOBIN, name(Two) title("Box Plot TOBIN")
graph export BoxPlot_TOBIN.png

*Deal with outliers on SALES
winsor2 SALES, replace cut(1 99) trim
graph box SALES, name(Three) title("Box Plot SALES")
graph export BoxPlot_SALES.png

*Deal with outliers on ASSETS
winsor2 ASSETS, replace cut(1 99) trim
graph box ASSETS, name(Four) title("Box Plot ASSETS")
graph export BoxPlot_ASSETS.png

*Deal with outliers on EMPLOYEES
winsor2 EMPLOYEES, replace cut(1 99) trim
graph box ASSETS, name(Five) title("Box Plot EMPLOYEES")
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*Deal with outliers on MKTCAP
winsor2 MKTCAP, replace cut(1 99) trim
graph box MKTCAP, name(Six) title("Box Plot MKTCAP")
```

```
graph export BoxPlot_MKTCAP.png

*Deal with outliers on AGE
winsor2 AGE, replace cut(1 99) trim
graph box AGE, name(Seven) title("Box Plot AGE")
graph export BoxPlot_AGE.png

*Deal with outliers on DA
winsor2 DA, replace cut(1 99) trim
graph box DA, name(Eight) title("Box Plot DA")
graph export BoxPlot_DA.png

*Deal with outliers on DE
winsor2 DE, replace cut(1 99) trim
graph box DE, name(Nine) title("Box Plot DE")
graph export BoxPlot_DE.png

*Deal with outliers on BETA
winsor2 BETA, replace cut(1 99) trim
graph box BETA, name(Ten) title("Box Plot BETA")
graph export BoxPlot_BETA.png

*Deal with outliers on CAPEX
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winsor2 RD, replace cut(1 99) trim
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*Deal with outliers on GSALES
winsor2 GSALES, replace cut(1 99) trim
graph box GSALES, name(Thirteen) title("Box Plot GSALES")
graph export BoxPlot_GSALES.png

*Deal with outliers on GASSETS
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graph box GASSETS, name(Fourteen) title("Box Plot GASSETS")
graph export BoxPlot_GASSETS.png

*Deal with outliers on CURRENT
winsor2 CURRENT, replace cut(1 99) trim
graph box CURRENT, name(Fifteen) title("Box Plot CURRENT")
graph export BoxPlot_CURRENT.png

*Deal with outliers on QUICK
winsor2 QUICK, replace cut(1 99) trim
graph box QUICK, name(Sixteen) title("Box Plot QUICK")
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*Deal with outliers on CASH
winsor2 CASH, replace cut(1 99) trim
graph box CASH, name(Seventeen) title("Box Plot CASH")
```

```
graph export BoxPlot_CASH.png

*Deal with outliers on PE
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graph export BoxPlot_PE.png

*Deal with outliers on MA
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*Deal with multicollinearity
regress GPM SALES ASSETS EMPLOYEES MKTCAP AGE DA DE BETA CAPEX RD GSALES GASSETS
CURRENT QUICK CASH PE MA
vif
drop CURRENT ASSETS QUICK EMPLOYEES DE SALES GASSETS
regress GPM MKTCAP AGE DA BETA CAPEX RD GSALES CASH PE MA
vif
asdoc vif, replace save(Summary_Tables.rtf) title(Final VIFs)

*Descriptive statistics and correlation analysis
xtdes
asdoc xtdes, append title(Output xtdes)
xtsum
asdoc xtsum GPM TOBIN, append title(Output xtsum for Dependent Variables)
asdoc xtsum MKTCAP AGE DA BETA CAPEX RD GSALES CASH PE MA, append title(Output xtsum
for Independent Variables)
pwcorr MKTCAP AGE DA BETA CAPEX RD GSALES CASH PE MA, sig star(10)
asdoc pwcorr MKTCAP AGE DA BETA CAPEX RD GSALES CASH PE MA, sig star(10) append
title(Correlation Matrix)

*Regressions on GPM
*FE model
xtreg GPM MKTCAP AGE DA BETA CAPEX RD GSALES CASH PE MA, fe
estimates store FE_GPM
*RE model
xtreg GPM MKTCAP AGE DA BETA CAPEX RD GSALES CASH PE MA, re
estimates store RE_GPM
*Hausman test
hausman FE_GPM RE_GPM, sigmamore
*BP LM test for RE
xtreg GPM MKTCAP AGE DA BETA CAPEX RD GSALES CASH PE MA, re
xttest0
*BP test for heteroskedasticity on pooled OLS
regress GPM MKTCAP AGE DA BETA CAPEX RD GSALES CASH PE MA
hettest
*Pooled OLS
regress GPM MKTCAP AGE DA BETA CAPEX RD GSALES CASH PE MA
asdoc regress GPM MKTCAP AGE DA BETA CAPEX RD GSALES CASH PE MA, append title(Pooled
OLS Model on GPM)

*Regressions on TOBIN
*FE model
xtreg TOBIN MKTCAP AGE DA BETA CAPEX RD GSALES CASH PE MA, fe
```

```
estimates store FE_TOBIN
*RE model
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estimates store RE_TOBIN
*Hausman test
hausman FE_TOBIN RE_TOBIN, sigmamore
*BP LM test for RE
xtreg TOBIN MKTCAP AGE DA BETA CAPEX RD GSALES CASH PE MA, re
xttest0
*BP test for heteroskedasticity on pooled OLS
regress TOBIN MKTCAP AGE DA BETA CAPEX RD GSALES CASH PE MA
hettest
*Pooled OLS
regress TOBIN MKTCAP AGE DA BETA CAPEX RD GSALES CASH PE MA
asdoc regress TOBIN MKTCAP AGE DA BETA CAPEX RD GSALES CASH PE MA, append
title(Pooled OLS Model on TOBIN)

*Create a docx file filled with graphs
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putdocx paragraph, tofooter(npage)
putdocx pagenumber
putdocx paragraph, style(Title)
putdocx text ("Graphs")
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putdocx text ("Box Plot GPM"), linebreak
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```

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putdocx save Summary_Graphs, replace
```

Appendix I: McPhy's Valuation Overview

Reported and Restated Consolidated Income Statement

Consolidated Income Statement

(Thousands €)	2019	2020	2021	2022
	Historicals			
Color Coding				
Hardcoded Value: Blue				
Calculation: Black				
Revenues	**11,387**	**13,694**	**13,130**	**16,061**
Other Income from Operating Activities	4,076	947	1,483	1,882
Income from Current Operations	**15,463**	**14,641**	**14,613**	**17,943**
Goods Consumed	(5,787)	(7,711)	(10,425)	(16,025)
Change in Stocks of Finished Products, Work in Progress	(355)	353	(102)	125
Payroll Charges	(7,149)	(8,883)	(11,631)	(17,654)
External Charges	(6,007)	(5,921)	(7,835)	(21,038)
Taxes and Duties	(89)	(101)	(128)	(190)
Amortization	(1,531)	(1,207)	(1,512)	(1,774)
Provisions	(1,029)	43	(6,529)	222
Current Operating Income	**(6,484)**	**(8,786)**	**(23,549)**	**(38,391)**
Non-Current Operating Income and Charges	(64)	(236)	31	(57)
Net Operating Income	**(6,548)**	**(9,022)**	**(23,518)**	**(38,448)**
Income from Cash and Cash Equivalents	480	46	166	701
Cost of Gross Financial Debt	(110)	(298)	(207)	(314)
Cost of Net Financial Debt	370	(252)	(41)	387
Tax Charge on Income	(77)	(66)	(14)	(97)
Net Income from Ordinary Activities	(6,255)	(9,340)	(23,573)	(38,158)
Net Income (Loss) for Year	**(6,255)**	**(9,340)**	**(23,573)**	**(38,158)**
Attributable to the Owners of the Company	(6,255)	(9,340)	(23,573)	(38,158)
Attributable to Non-Controlling Interests	0	0	0	0
Net Earnings per Share - Attributable to Owners of the Company	(0.42)	(0.34)	(0.85)	(1.37)
Net Diluted Earnings per Share - Attributable to Owners of the Company	(0.42)	(0.34)	(0.85)	(1.37)
Net Income (Loss) for Year	(6,255)	(9,340)	(23,573)	(38,158)
Actuarial Gains or (Losses) on Pension Obligations	(12)	4	43	77
Currency Translation Adjustments	82	(24)	49	(149)
Deferral Taxes Recognized as Equity	3	(1)	(11)	(21)
Other Comprehensive Income	73	(21)	81	(93)
Total Comprehensive Income (Loss) for Year	**(6,182)**	**(9,361)**	**(23,492)**	**(38,251)**

Taxes Breakdown

Thousands €	2019	2020	2021	2022
Profit before Income Tax	(6,178)	(9,274)	(23,559)	(38,061)
Tax Rate in France	28.0%	28.0%	26.5%	25.0%
Tax Calculated at Rate Applicable in France	**1,730**	**2,597**	**6,243**	**9,515**
Non-Capitalized Losses	(2,031)	(5,882)	(6,447)	(13,350)
Effect of Consolidation Eliminations	0	0	0	3,267
Effect of Tax Credits and Tax Exemptions	179	3,353	148	275
Effect of Different Taxation Rates	(9)	(23)	(64)	709
Effect of Other Non-Deductible Charges and Application of the Liability Method	54	(110)	107	(513)
Tax Charge on Income	**(77)**	**(65)**	**(13)**	**(97)**
Core Tax Adjustments	0	0	0	0
Non-Core Tax Adjustments	179	3,353	148	275
Financial Tax Adjustments	(1,986)	(6,015)	(6,404)	(9,887)

Restated Consolidated Income Statement

(Thousands €)		2019	2020	2021	2022
		Historicals			
CORE BUSINESS					
Electrolysers (Large Capacity)		-	6,710	5,121	8,031
	% of Total Revenue		49%	39%	50%
Electrolysers (Small Capacity)		-	1,506	2,101	2,891
	% of Total Revenue		11%	16%	18%
Hydrogen Fueling Stations		-	5,478	5,909	5,140
	% of Total Revenue		40%	45%	32%
Net Revenues		**11,387**	**13,694**	**13,130**	**16,061**
	% Change		20.3%	-4.1%	22.3%
Goods Consumed		(5,787)	(7,711)	(10,425)	(16,025)
Change in Stocks of Finished Products, Work in Progress		(355)	353	(102)	125
Employee Compensation and Benefits		-	-	(8,375)	(11,358)
Social Security and Provident Insurance		-	-	(2,913)	(4,196)
Current Service Cost Related to Pension Obligations		-	-	0	0
Expenses Related to Share-Based Payment Instruments		-	-	(212)	(698)
Employee Profit-Sharing		-	-	(131)	(1,402)
Payroll Charges		(7,149)	(8,883)	(11,631)	(17,654)
External Charges		(6,007)	(5,921)	(7,835)	(21,038)
Intangible Non-Current Assets		(91)	(93)	(96)	(137)
Tangible Non-Current Assets		(1,310)	(1,098)	(1,480)	(1,674)
Gains (Loss) from Asset Retirements		(130)	(16)	67	37
Amortization		(1,531)	(1,207)	(1,569)	(1,774)
Total Costs		**(20,829)**	**(23,369)**	**(31,502)**	**(56,366)**
	% Change		12.2%	34.8%	78.9%
Core Result Before Taxes		**(9,442)**	**(9,675)**	**(18,372)**	**(40,305)**
Statutory Taxes		2,644	2,709	4,869	10,076
Core Result		**(6,798)**	**(6,966)**	**(13,503)**	**(30,229)**
	% Change		-2.5%	-93.8%	-123.9%
NON-CORE BUSINESS					
Subsidies		3290	214	0	0
Research Tax Credit		640	548	693	1,099
Other Income		146	185	780	777
Non-Recurring Income from Previous Years		-	-	10	5
Other Income from Operating Activities		4,076	947	1,483	1,881
Provisions		(1,199)	(563)	(7,309)	(6,235)
Reversals of Provisions		195	540	780	6,457
Non-Recurring Provisions / Reversals		(25)	66	0	0
Total Provisions		(1,029)	43	(6,529)	222
Income from Disposal of Marketable Securities		0	26	73	606
Other Financial Income		480	19	92	95
Income from Cash and Cash Equivalents		480	45	165	701
Non-Core Result Before Taxes		**3,527**	**1,035**	**(4,881)**	**2,804**
Statutory Taxes		(988)	(290)	1,293	(701)
Non-Core Tax Adjustments		179	3,353	148	275
Actuarial Gains or (Losses) on Pension Obligations		(12)	4	43	77
Other Comprehensive Income		(12)	4	43	77
Non-Core Result		**2,706**	**4,102**	**(3,397)**	**2,455**
	% Change		51.6%	-182.8%	172.3%
FINANCIAL BUSINESS					
Taxes and Duties		(89)	(101)	(128)	(190)
Non-Current Operating Income and Charges		(64)	(236)	31	(57)
Cost of Financial Debt		(89)	(141)	(185)	(312)
Other Financial Charges		(21)	(157)	(21)	(2)
Cost of Gross Financial Debt		(110)	(298)	(206)	(314)
Financial Result Before Taxes		**(263)**	**(635)**	**(303)**	**(561)**
Statutory Taxes		74	178	80	140
Financial Tax Adjustments		(1,986)	(6,015)	(6,404)	(9,887)
Currency Translation Adjustments		82	(24)	49	(149)
Deferral Taxes Recognized as Equity		3	(1)	(11)	(21)
Other Comprehensive Income		85	(25)	38	(170)
Financial Result		**(2,090)**	**(6,497)**	**(6,589)**	**(10,478)**
	% Change		-210.8%	-1.4%	-59.0%
CHECK		**(6,182)**	**(9,361)**	**(23,489)**	**(38,252)**

Comments

The core business includes:
- Revenues deriving from electrolysers (both of small and large capacity) and hydrogen fueling stations.
- Costs related to goods consumed, change in stocks of finished products, payroll charges, external charges and amortization.
- Statutory taxes of competence of the core result.

External charges were classified as part of the core business because they include expenses related to the company's activities, such as subcontracting services, prospecting costs and technical expertise.

The non-core business includes:
- Other income associated with operating activities, provisions and income from cash and cash equivalents.
- Statutory taxes of competence of the non-core result.
- The effect of tax credits and tax exemptions, which was considered as a non-core tax adjustment.
- Actuarial gains or losses on pension obligations, which are part of the other comprehensive income.

Among the others, provisions refer to golden handshakes, provisions for guarantees, provisions for group obligations and contributions to pensions funds and statutory bodies. Therefore, they represent financial commitments, legal obligations and contributions that support the Company's overall functioning, but are not directly tied to its core operational activities. From here, their classification in this category.
The cost of net financial debt was divided into two items, income from cash and cash equivalents and cost of gross financial debt, with the former being assigned to this category and the latter to the financial business.

The financial business includes:
- Taxes and duties, non-current operating income and charges and cost of gross financial debt.
- Statutory taxes of competence of the financial result.
- Currency translation adjustments and deferred taxes recognized as equity, which are part of the other comprehensive income.

Even if no information is provided by annual reports, taxes and duties typically refer to payments imposed by governmental authorities, such as a Value-Added Tax (VAT), custom duties or other regulatory fees. Therefore, they were classified as financial items.

Annual reports did not split income and charges related to non-current operations. Therefore, since charges resulted to be higher than income, it was chosen to classify the entire item in this category. The cost of net financial debt was divided into two items, income from cash and cash equivalents and cost of gross financial debt, with the former being assigned to the non-core business and the latter to this category.

Reported and Restated Consolidated Balance Sheet

Consolidated Balance Sheet

(Thousands €)	Historicals 2019	2020	2021	2022
Color Coding				
Hardcoded Value: Blue				
Calculation: Black				
ASSETS				
Goodwill	2,487	2,487	2,487	2,487
Other Intangible Non-Current Assets	157	177	3,658	7,602
Tangible Non-Current Assets	2,808	3,755	4,836	18,052
Non-Current Financial Assets	316	340	420	12,857
Deferred Tax Assets	77	87	126	66
Total Non-Current Assets	**5,845**	**6,846**	**11,527**	**41,064**
Inventories	1,941	2,842	4,252	12,015
Trade and Other Receivables	7,714	12,019	11,131	19,118
Current Tax Assets	746	748	696	1,101
Other Current Financial Assets	0	0	0	0
Cash and Cash Equivalents	12,995	197,674	177,155	135,463
Total Current Assets	**23,396**	**213,283**	**193,234**	**167,697**
Total Assets	**29,241**	**220,129**	**204,761**	**208,761**
LIABILITIES AND EQUITY				
Capital	2,079	3,343	3,353	3,355
Share Premiums	30,854	206,858	201,855	191,621
Treasury Shares	(70)	(36)	(1,237)	(895)
Accumulated Retained Earnings	(16,281)	(12,929)	(31,360)	(59,151)
Shareholders' Equity	**16,582**	**197,236**	**172,611**	**134,930**
Non-Controlling Interests	0	0	0	0
Total Equity	16,582	197,236	172,611	134,930
Investment Subsidies	0	0	0	2,500
Provisions > 1 Year	756	1,218	2,195	2,482
Borrowings and Financial Debt Maturity > 1 Year	1,784	2,463	3,518	4,505
Other Payables	0	0	0	0
Deferred Tax Liabilities	578	609	640	688
Total Non-Current Liabilities	**3,118**	**4,290**	**6,353**	**10,175**
Provisions < 1 Year	584	499	6,504	5,651
Borrowings and Financial Debt Maturing < 1 Year	1,088	4,919	1,065	1,552
Trade and Other Payables	4,881	6,027	6,682	18,223
Other Current Liabilities	2,990	7,160	11,546	38,230
Current Tax	0	0	0	0
Total Current Liabilities	**9,543**	**18,605**	**25,797**	**63,656**
Total Equity and Liabilities	**29,243**	**220,131**	**204,761**	**208,761**

Restated Consolidated Balance Sheet

(Thousands €)	Historicals 2019	2020	2021	2022
CORE BUSINESS				
Operating Cash	650	9,884	8,858	6,773
% of Total Cash and Cash Equivalents	5%	5%	5%	5%
Goodwill	2,487	2,487	2,487	2,487
Concessions, Patents, Licenses	157	150	192	362
Capitalized Development Expenses	0	26	3,369	6,208
Other Intangible Non-Current Assets	157	176	3,561	6,570
Land and Buildings	1,215	2,034	2,569	6,760
Equipment and Plant	1,046	922	896	744
Other Tangible	548	800	1,371	10,547
Tangible Non-Current Assets	2,809	3,756	4,836	18,051
Raw Materials and Other Supplies	1,716	2,316	3,957	11,449
Work in Progress and Services	162	227	32	200
Finished Products	589	659	594	550
Impairment	(527)	(361)	(331)	(184)
Inventories	1,940	2,841	4,252	12,015
Trade and Other Receivables	7,714	12,019	11,131	19,118
Trade and Other Payables	(4,881)	(6,027)	(6,682)	(18,223)
Invested Capital Core Business	**10,876**	**25,136**	**28,443**	**46,791**
% Change		131.1%	13.2%	64.5%
NON-CORE BUSINESS				
Other	0	0	97	1,031
Other Intangible Non-Current Assets	0	0	97	1,031
Provisions > 1 Year	(756)	(1,218)	(2,195)	(2,482)
Provisions < 1 Year	(584)	(499)	(6,504)	(5,651)
Other Current Liabilities	(2,990)	(7,160)	(11,546)	(38,230)
Invested Capital Non-Core Business	**(4,330)**	**(8,877)**	**(20,148)**	**(45,332)**
% Change		-105.0%	-127.0%	-125.0%
FINANCIAL BUSINESS				
Excess of Cash	12,345	187,790	168,297	128,690
% of Total Cash and Cash Equivalents	95%	95%	95%	95%
Loans, Deposits and Other Receivables Non-Current	316	340	420	492
Convertible Bonds	0	0	0	12,365
Non-Current Financial Assets	316	340	420	12,857
Taxable Temporary Differences	14	15	0	15
Consolidation Restatements	62	72	126	51
Deferred Tax Assets	76	87	126	66
Current Tax Assets	746	748	696	1,101
Investment Subsidies	0	0	0	(2,500)
Bank Borrowing	(684)	(483)	(830)	(730)
Repayable Advances	(372)	(386)	(389)	(195)
Debt on Financial Leases	(263)	(74)	0	0
Lease Agreements	(465)	(1,520)	(2,299)	(3,580)
Borrowings and Financial Debt Maturity > 1 Year	(1,784)	(2,463)	(3,518)	(4,505)
Taxable Temporary Differences	(476)	(539)	(602)	(665)
Other Consolidation Restatements	(101)	(70)	(38)	(23)
Deferred Tax Liabilities	(577)	(609)	(640)	(688)
Bank Borrowing	(331)	(4,201)	(133)	(125)
Repayable Advances	0	(51)	(51)	(51)
Debt on Financial Leases	-230	-189	0	0
Lease Agreements	(527)	(477)	(881)	(1,375)
Borrowings and Financial Debt Maturing < 1 Year	(1,088)	(4,918)	(1,065)	(1,551)
Net Financial Assets	**10,034**	**180,975**	**164,316**	**133,470**
% Change		1703.6%	-9.2%	-18.8%
Capital	2,079	3,343	3,353	3,355
Share Premiums	30,854	206,858	201,855	191,621
Treasury Shares	(70)	(36)	(1,237)	(895)
Accumulated Retained Earnings	(16,281)	(12,929)	(31,360)	(59,151)
Total Equity	**16,582**	**197,236**	**172,611**	**134,930**
% Change		1089.5%	-12.5%	-21.8%
CHECK	**16,580**	**197,234**	**172,611**	**134,929**

Comments

The core business includes:
- Operating cash (5% of total cash and cash equivalents).
- Goodwill, related to the acquisition of McPhy Italy in 2013.
- A portion of other intangible non-current assets, namely concessions, patents, licenses and capitalized development expenses.
- Tangible non-current assets, which include land, buildings, equipment, plant and others.
- Inventories, which include raw materials, other supplies, work in progress, services, finished products and related impairment.
- Trade and other receivables.
- Trade and other payables.

It was assumed that concessions, patents and licenses relate to key technologies used in the core product offerings or core business operations.

Generally, capitalized development expenses represent investments made to develop new products, processes or technologies directly related to the core operations and the future growth of the business. From here, their classification as part of the core business.

Tangible non-current assets commonly refer to physical assets which are used in the Company's ongoing operations to support the core business activities.

The non-core business includes:
- A portion of other intangible non-current assets, for which there was no specification in the Company's annual reports.
- Provisions.
- Other current liabilities.

The Company's reports clarify that provisions for other risks and charges refer to incidents happened in power plants or to losses on completion and commitments on current contracts. Since these events are not part of the Company's regular operations, they were classified in the non-core business category.

No specific information on other current liabilities was provided, so it was assumed that they are not integral to the day-to-day operations of the Company.

The financial business includes:
- Financial cash (95% of total cash and cash equivalents).
- Non-current financial assets, which include loans, deposits, other receivables and convertible bonds.
- Deferred tax assets, current tax assets and deferred tax liabilities.
- Investment subsidies.
- Borrowings and financial debt.

Deferred tax assets give rise to future tax benefits that can be utilized to offset future tax liabilities. Since they represent financial benefits, they were classified as part of the financial business section.

Deferred tax liabilities represent financial obligations related to future tax payments. Since they are financial in nature, they were classified as part of the financial business section.

Current tax assets represent tax benefits that the Company expects to receive in the short term. From here, their classification in the financial business section.

McPhy's investment subsidies include payments in the form of financial support for the Maugis Industrial Revitalization fund for the electrolyser gigafactory project. Therefore, they were classified in the financial business section.

Reported Cash Flow Statement

Consolidated Cash Flow Statement				
	Historicals			
(Thousands €)	**2019**	**2020**	**2021**	**2022**
Color Coding				
Hardcoded Value: Blue				
Calculation: Black				
Net Income (Loss) for Year	**(6,255)**	**(9,340)**	**(23,573)**	**(38,158)**
Depreciation, Amortization, and Impairment	1,872	1,148	7,561	1,285
Other Income and Expenses	(3,545)	603	(162)	698
Gains (Losses) on Disposals	130	31	402	248
Cash Flow after Cost of Net Financial Debt and Taxes	**(7,798)**	**(7,558)**	**(15,772)**	**(35,927)**
Cost of Net Financial Debt	(370)	174	(55)	312
Tax Expense	77	66	(679)	(1,003)
Cash Flow before Cost of Net Financial Debt and Taxes	**(8,091)**	**(7,318)**	**(16,506)**	**(36,618)**
Taxes Paid	(9)	(11)	683	684
Reduction (Increase) in Inventories	222	(900)	(1,410)	(7,764)
Reduction (Increase) in Trade Receivables	(1,119)	(2,679)	(24)	(1,127)
Reduction (Increase) in Other Receivables	91	(1,740)	885	(5,358)
Increase (Reduction) in Trade Payables	715	1,146	655	8,626
Increase (Reduction) in Other Payables	697	4,170	4,387	(2,156)
Operating Subsidies Received	0	0	0	26,853
Net Cash Flow from Operating Activities	**(7,494)**	**(7,332)**	**(11,330)**	**(16,860)**
Acquisition of Intangible Non-Current Assets	(83)	(115)	(3,578)	(4,081)
Acquisition of Tangible Non-Current Assets	(77)	(340)	(1,562)	(9,008)
Other Cash Flows from Investing Activities	0	0	0	(12,435)
Investment Subsidies Received	0	0	0	2,500
Net Cash Flow from Investing Activities	**(160)**	**(455)**	**(5,140)**	**(23,024)**
Capital Increase Sums Received	7,073	189,464	414	95
Proceeds Drawn from New Borrowings	0	4,072	480	0
Repayment of Borrowings	(1,317)	(1,068)	(4,943)	(1,744)
Net Cash Flow from Financing Activities	**5,756**	**192,468**	**(4,049)**	**(1,649)**
Effect of Changes in Exchange Rates	0	0	0	(161)
Net Increase (Decrease) in Cash and Cash Equivalents	**(1,898)**	**184,681**	**(20,519)**	**(41,694)**
Cash and Cash Equivalents at Beginning of Period	**14,895**	**12,995**	**197,674**	**177,155**
Cash and Cash Equivalents at End of Period	**12,997**	**197,676**	**177,155**	**135,461**

Cash Flow Management

Cash Flow Management Indicators		Historicals				Comments
(Thousands €)		2019	2020	2021	2022	
Color Coding						
Hardcoded Value: Blue						
Calculation: Black						
Inventories		1,940	2,841	4,252	12,015	
COGS		6,142	7,358	10,527	15,900	
Average Holding Period		**115**	**141**	**147**	**276**	In 2022, McPhy held inventory for approximately 276 days before selling it. On average, it took the Company a significant amount of time to sell its inventory.
	% Change		22.2%	4.6%	87.1%	
Trade and Other Receivables		7,714	12,019	11,131	19,118	
Net Revenues		11,387	13,694	13,130	16,061	
Average Collection Period		**247**	**320**	**309**	**434**	In 2022, McPhy took around 434 days to collect payments from its clients, which is indeed a considerable amount of time.
	% Change		29.6%	-3.4%	40.4%	
Trade and Other Payables		4,881	6,027	6,682	18,223	
COGS		6,142	7,358	10,527	15,900	
Average Payable Period		**290**	**299**	**232**	**418**	In 2022, McPhy needed about 418 days to make payments to its suppliers, which implies that the Company took a relatively long time to settle its payables.
	% Change		3.1%	-22.5%	80.6%	
Cash Conversion Cycle		**72**	**162**	**225**	**292**	In 2022, McPhy's cash conversion cycle equalled 292 days. Therefore, the Company had a relatively long operating cycle, suggesting challenges in managing cash flow efficiently and optimizing the cash conversion process (especially related to
	% Change		123.9%	38.7%	29.7%	
						There are potential areas of improvement in McPhy's cash flow management. In fact, a long average holding period, collection period and cash conversion cycle may negatively impact liquidity,

Liquidity

Liquidity Indicators		Historicals				Comments
(Thousands €)		2019	2020	2021	2022	
Color Coding						
Hardcoded Value: Blue						
Calculation: Black						
Total Current Assets		23,396	213,283	193,234	167,697	
Total Current Liabilities		9,543	18,605	25,797	63,656	
Current Ratio		**2.5**	**11.5**	**7.5**	**2.6**	In 2022, McPhy's current ratio was bigger than 1, meaning that the Company verified the rule of minimum short-term financial equilibrium. This suggested a healthy liquidity position, with a sufficient buffer to cover short-term obligations.
	% Change		367.6%	-34.7%	-64.8%	
Total Current Assets		23,396	213,283	193,234	167,697	
Inventories		1,940	2,841	4,252	12,015	
Total Current Liabilities		9,543	18,605	25,797	63,656	
Quick Ratio		**2.2**	**11.3**	**7.3**	**2.4**	In 2022, the quick ratio was also bigger than 1, meaning that the Company was able to meet its short-term obligations without the need to rely heavily on inventories.
	% Change		403.1%	-35.2%	-66.6%	
Cash and Cash Equivalents		12,995	197,674	177,155	135,463	
Total Current Liabilities		9,543	18,605	25,797	63,656	
Cash Ratio		**1.4**	**10.6**	**6.9**	**2.1**	McPhy's cash ratio of 2022 testifies that the business had more than enough cash to cover the short-term debts on its Balance Sheet. The Company had a strong ability to cover short-term obligations with readily available cash resources.
	% Change		680.2%	-35.4%	-69.0%	
Total Current Assets		23,396	213,283	193,234	167,697	
Total Current Liabilities		9,543	18,605	25,797	63,656	
Net Working Capital		**13,853**	**194,678**	**167,437**	**104,041**	A positive net working capital of 104,041 thousands suggests a healthy liquidity position since the Company had sufficient assets to cover short-term obligations.
	% Change		1305.3%	-14.0%	-37.9%	
						Overall, the Company's liquidity position is rather favorable. There is sufficient liquidity to meet short-term obligations, with a significant buffer on current assets.

Capital Structure

Capital Structure Indicators						Comments
		Historicals				
(Thousands €)		**2019**	**2020**	**2021**	**2022**	
Color Coding						
Hardcoded Value: Blue						These ratios have been computed considering net financial assets, which represent all the financial resources that a company has, including cash, cash equivalents, marketable securities and other liquid financial assets. An alternative version of these ratios considers net debt instead of net financial assets. Net debt refers to the total debt obligations of a company minus its cash and cash equivalents.
Calculation: Black						
Net Financial Assets		10,034	180,975	164,316	133,470	
Total Equity		16,582	197,236	172,611	134,930	
Gearing Ratio		**0.38**	**0.48**	**0.49**	**0.50**	
	% Change		26.9%	1.9%	2.0%	
						McPhy's total debt represents 50% of the sum of its debt and equity. This indicates a moderate level of leverage in the capital structure, with a balanced mix of debt and equity financing.
Net Financial Assets		10,034	180,975	164,316	133,470	
Total Equity		16,582	197,236	172,611	134,930	
Debt-to-Equity Ratio		**0.6**	**0.9**	**1.0**	**1.0**	
	% Change		51.6%	3.7%	3.9%	McPhy's total debt is very similar to its equity, thus suggesting an equal proportion of debt and equity in the capital structure.
Net Financial Assets		10,034	180,975	164,316	133,470	
EBITDA		(3,900)	(7,600)	(15,500)	(36,800)	
Debt-to-EBITDA Ratio		**(2.6)**	**(23.8)**	**(10.6)**	**(3.6)**	A negative D/EBITDA ratio suggests a challenging financial sitation as the company's debt burden exceeds its operating profitability.
	% Change		-825.5%	55.5%	65.8%	
PP&E		2,809	3,756	4,836	18,051	
Total Assets		29,241	220,129	204,761	208,761	
PP&E/Total Assets		**0.1**	**0.0**	**0.0**	**0.1**	A PP&E/Total Assets ratio of 0.1 indicates that about 10% of McPhy's total assets are comprised of property, plant and equipment.
	% Change		-82.2%	38.4%	266.1%	
Total Equity		16,582	197,236	172,611	134,930	
Total Current Liabilities		9,543	18,605	25,797	63,656	
Total Non-Current Liabilities		3,118	4,290	6,353	10,175	
Solvency Ratio		**1.3**	**8.6**	**5.4**	**1.8**	A solvency ratio equal to 1.8 shows that the Company's equity is 1.8 times the sum of its current and non-current liabilities. This provides us with an indication of a relatively strong solvency position and the ability to cover both short-term and long-term obligations.
	% Change		557.8%	-37.7%	-66.0%	
Total Equity		16,582	197,236	172,611	134,930	
Total Assets		29,241	220,129	204,761	208,761	
Financial Autonomy Ratio		**0.6**	**0.9**	**0.8**	**0.6**	The financial autonomy ratio indicates that approximately 60% of the Company's total assets are financed by equity. This reflects a significant ownership stake by shareholders in the capital structure.
	% Change		58.0%	-5.9%	-23.3%	
Net Financial Assets		10,034	180,975	164,316	133,470	
Total Assets		29,241	220,129	204,761	208,761	
Debt-to-Assets Ratio		**0.3**	**0.8**	**0.8**	**0.6**	A D/A ratio of 0.6 suggests that McPhy's total debt represents approximately 60% of its total assets, reflecting a moderate level of debt relative to its asset base.
	% Change		139.6%	-2.4%	-20.3%	
						The Company presents moderate leverage levels, a balanced mix of debt and equity and a solid financial position with strong solvency.

Profitability

Profitability Indicators						Comments
		Historicals				
(Thousands €)		**2019**	**2020**	**2021**	**2022**	
Color Coding						
Hardcoded Value: Blue						
Calculation: Black						
Net Revenues		11,387	13,694	13,130	16,061	
COGS		(6,142)	(7,358)	(10,527)	(15,900)	
Gross Profit		5,245	6,336	2,603	161	
Gross Profit Margin		**46.1%**	**46.3%**	**19.8%**	**1.0%**	A GPM of 1% shows that, for every unit of revenue, McPhy retains 1% as gross profit. Thence, there is a very low level of profitability on the sale of goods.
EBITDA		(3,900)	(7,600)	(15,500)	(36,800)	
Net Revenues		11,387	13,694	13,130	16,061	
EBITDA Margin		**-34.2%**	**-55.5%**	**-118.1%**	**-229.1%**	A negative EBITDA margin of -229.1% suggests that the Company's operating expenses and costs exceed its generated revenue by a substantial margin.
Core Result Before Taxes		(9,442)	(9,675)	(18,372)	(40,305)	
Net Revenues		11,387	13,694	13,130	16,061	
EBIT Margin		**-82.9%**	**-70.7%**	**-139.9%**	**-250.9%**	A negative EBIT margin of -250.9% indicates that the Company is operating at a significant loss, with operating expenses exceeding the revenue generated.
Net Operating Income		(6,548)	(9,022)	(23,518)	(38,448)	
Net Revenues		11,387	13,694	13,130	16,061	
Return on Sales (ROS)		**-57.5%**	**-65.9%**	**-179.1%**	**-239.4%**	In line with the previous indicators, a negative ROS of -239.4% suggests that McPhy is operating at a substantial loss.
Net Income (Loss) for Year		(6,255)	(9,340)	(23,573)	(38,158)	
Net Revenues		11,387	13,694	13,130	16,061	
Net Margin		**-54.9%**	**-68.2%**	**-179.5%**	**-237.6%**	A negative net margin of -237.6% indicates that McPhy is experiencing significant losses relative to its revenue.
Core Result		(6,798)	(6,966)	(13,503)	(30,229)	
Non-Core Result		2,706	4,102	(3,397)	2,455	
Operational Result		(4,092)	(2,864)	(16,900)	(27,774)	
Total Assets		29,241	220,129	204,761	208,761	
Return on Assets (ROA)		**-14.0%**	**-1.3%**	**-8.3%**	**-13.3%**	A negative ROA of -13.3% reflects that the Company is generating a negative return on its total assets, indicating significant losses in relation to the assets employed.
Net Revenues		11,387	13,694	13,130	16,061	
Invested Capital Core Business		10,876	25,136	28,443	46,791	
Invested Capital Non-Core Business		(4,330)	(8,877)	(20,148)	(45,332)	
Total Invested Capital		6,546	16,259	8,295	1,459	
Asset Turnover (1)		**1.7**	**0.8**	**1.6**	**11.0**	A high asset turnover of 11 indicates that McPhy generates a significant amount of revenues relative to its total invested capital.
	% Change		-51.6%	87.9%	595.4%	
Net Revenues		11,387	13,694	13,130	16,061	Two different asset turnover definition were here analyzed.
Total Assets		29,241	220,129	204,761	208,761	
Asset Turnover (2)		**0.4**	**0.1**	**0.1**	**0.1**	A low asset turnover of 0.1 indicates that McPhy generates a relatively small amount of revenue relative to its total assets.
	% Change		-84.0%	3.1%	20.0%	
						Overall, profitability indicators reveal a challenging financial performance for McPhy, with currently negative margins and returns, coupled with losses relative to revenues.

Return on Invested Capital (ROIC)

ROIC Indicators					Comments
		Historicals			
(Thousands €)	**2019**	**2020**	**2021**	**2022**	
Color Coding					
Hardcoded Value: Blue					
Calculation: Black					
CORE BUSINESS					
Core Result		(6,966)	(13,503)	(30,229)	
Invested Capital Core Business (t-1)		10,876	25,136	28,443	
Core ROIC (1)		**-64.1%**	**-53.7%**	**-106.3%**	A negative core ROIC shows that the core business is generating a negative return on the invested capital. Therefore, the core business is not generating sufficient profits to cover the invested capital, resulting in a loss.
Core Result		(6,966)	(13,503)	(30,229)	
Net Revenues		13,694	13,130	16,061	
Invested Capital Core Business (t-1)		10,876	25,136	28,443	
Core Operating Margin		**-50.9%**	**-102.8%**	**-188.2%**	Two different computation methodologies were followed to compute the core ROIC, but they resulted in the same final value.
Core Asset Turnover		**125.9%**	**52.2%**	**56.5%**	
Core ROIC (2)		**-64.1%**	**-53.7%**	**-106.3%**	
NON-CORE BUSINESS					
Non-Core Result		4,102	(3,397)	2,455	
Invested Capital Non-Core Business (t-1)		(4,330)	(8,877)	(20,148)	
Non-Core ROIC		**-94.7%**	**38.3%**	**-12.2%**	A negative non-core ROIC suggests that also the non-core business is generating a negative return on the invested capital. Therefore, non-core activities are not generating sufficient profits to cover their related invested capital, resulting in a loss.
FINANCIAL BUSINESS					
Financial Result		(6,497)	(6,589)	(10,478)	
Net Financial Assets (t-1)		10,034	180,975	164,316	
Financial ROIC		**-64.8%**	**-3.6%**	**-6.4%**	A negative financial ROIC indicates that also financial activities are generating a negative return relative to total debt. Therefore, financial activities are not generating sufficient profits to cover financial obligations, resulting in a loss.
TOTAL					
Core Result		(6,966)	(13,503)	(30,229)	
Non-Core Result		4,102	(3,397)	2,455	
Operating Result		(2,864)	(16,900)	(27,774)	
Invested Capital Core Business (t-1)		10,876	25,136	28,443	
Invested Capital Non-Core Business (t-1)		(4,330)	(8,877)	(20,148)	
Invested Capital (t-1)		6,546	16,259	8,295	
Total ROIC (1)		**-43.8%**	**-103.9%**	**-334.8%**	The total ROIC measures the combined return generated by both core and non-core activities relative to the total invested capital. A negative total ROIC of -334.8% suggests an overall negative return on the total invested capital. Combined activities are not generating sufficient profits to cover the total invested capital, resulting in a significant loss.
Core Result		(6,966)	(13,503)	(30,229)	
Non-Core Result		4,102	(3,397)	2,455	
Net Revenues		13,694	13,130	16,061	
Invested Capital Core Business (t-1)		10,876	25,136	28,443	
Invested Capital Non-Core Business (t-1)		(4,330)	(8,877)	(20,148)	
Operating Margin		**-20.9%**	**-128.7%**	**-172.9%**	McPhy is currently experiencing significant challenges in generating positive returns on its invested capital.
Asset Turnover		**209.2%**	**80.8%**	**193.6%**	
Total ROIC (2)		**-43.8%**	**-103.9%**	**-334.8%**	Two different computation methodologies were followed to compute the total ROIC, but they resulted in the same final value.

Return on Equity (ROE)

ROE Indicators					Comments
	Historicals				
(Thousands €)	**2019**	**2020**	**2021**	**2022**	
Color Coding					
Hardcoded Value: Blue					
Calculation: Black					
Total Comprehensive Income (Loss) for Year	(6,182)	(9,361)	(23,492)	(38,251)	
Total Equity	16,582	197,236	172,611	134,930	
ROE (1)	**-37.3%**	**-4.7%**	**-13.6%**	**-28.3%**	Due to the existence of a total comprehensive loss, ROE resulted to be negative during the period considered. A negative ROE indicates that McPhy is generating a poor return on the equity invested, probably because of operational challenges, financial difficulties and adverse market conditions that negatively impact profitability.
Core Result	(6,798)	(6,966)	(13,503)	(30,229)	
Non-Core Result	2,706	4,102	(3,397)	2,455	
Operating Result	(4,092)	(2,864)	(16,900)	(27,774)	
Total Equity	16,582	197,236	172,611	134,930	
Financial Result	(2,090)	(6,497)	(6,589)	(10,478)	Three different computation methodologies were followed to compute the ROE, but they resulted in the same final value.
Operating Result/Total Equity	-24.7%	-1.5%	-9.8%	-20.6%	
Financial Result/Total Equity	-12.6%	-3.3%	-3.8%	-7.8%	
ROE (2)	**-37.3%**	**-4.7%**	**-13.6%**	**-28.3%**	
Operating Result	(4,092)	(2,864)	(16,900)	(27,774)	
Invested Capital Core Business	10,876	25,136	28,443	46,791	
Invested Capital Non-Core Business	(4,330)	(8,877)	(20,148)	(45,332)	
Invested Capital	6,546	16,259	8,295	1,459	
Total Equity	16,582	197,236	172,611	134,930	
Financial Result	(2,090)	(6,497)	(6,589)	(10,478)	
Net Financial Assets	10,034	180,975	164,316	133,470	
Operating Result/Invested Capital	-62.5%	-17.6%	-203.7%	-1903.4%	
Invested Capital/Total Equity	39.5%	8.2%	4.8%	1.1%	
Financial Result/Net Financial Assets	-20.8%	-3.6%	-4.0%	-7.9%	
Net Financial Assets/Total Equity	60.5%	91.8%	95.2%	98.9%	
ROE (3)	**-37.3%**	**-4.7%**	**-13.6%**	**-28.3%**	

McPhy's Comparables

Comparables

Valuation Date: December 31, 2022

Thousands € - Valuation Date

Identifier	Company Name	Country	Market Capitalization	Total Debt	Cash and Short Term Investments	Net Debt	Preferred Shareholders Equity	Minority Interest	Enterprise Value (EV)	Leverage (D/E)	Raw Beta (3 Year Weekly)	Tax Rate	Unlevered Beta	EV/Sales (LTM)
Color Coding														
Hardcoded Value: Blue														
Calculation: Black														
APPROACH 1														
ALHRS.PA	Hydrogen Refueling Solutions SA	France	294,121	9,305	34,670	(25,365)	0	0	268,756	-8.6%	0.71	25%	0.71	13.53
GTT.PA	Gaztransport et Technigaz SA	France	3,700,420	4,046	212,847	(208,801)	0	41	3,491,660	-5.6%	0.26	25%	0.26	10.56
GWR.L	Ceres Power Holdings PLC	UK	673,648	3,124	182,320	(179,196)	0	0	494,452	-26.6%	1.91	25%	1.91	20.34
ITM.L	ITM Power PLC	UK	2,032,006	7,148	365,882	(358,734)	0	0	1,673,272	-17.7%	2.02	25%	2.02	46.79
NEL.OL	Nel ASA	Norway	21,659,872	224,424	3,125,758	(2,901,334)	0	0	18,758,538	-13.4%	1.32	22%	1.32	16.09
CCHE.PA	Seche Environment SA	France	705,624	701,681	129,472	572,209	0	7,286	1,285,119	80.3%	0.59	25%	0.37	1.47
DBG.PA	Derichebourg SA	France	656,718	976,600	323,200	653,400	0	5,000	1,315,118	98.7%	1.37	25%	0.79	0.34
RUBF.PA	Rubis SCA	France	2,532,658	2,311,564	805,353	1,506,211	0	126,826	4,165,695	56.6%	0.82	25%	0.57	0.56
Sector Average			**4,031,883**	**529,737**	**647,438**	**(117,701)**	**0**	**17,394**	**3,931,576**	**20.5%**	**1.13**	**24.6%**	**1.00**	**13.71**
Sector Min			294,121	3,124	34,670	(2,901,334)	0	0	268,756	-26.6%	0.26	22.0%	0.26	0.34
Sector Max			21,659,872	2,311,564	3,125,758	1,506,211	0	126,826	18,758,538	98.7%	2.02	25.0%	2.02	46.79
Sector Median			1,368,815	116,865	268,024	(102,281)	0	21	1,494,195	-7.1%	1.07	25.0%	0.75	12.04

Thousands € - Valuation Date

MCPHY.PA	McPhy Energy SA	France	341,136	6,057	135,463	(129,406)	0	0	211,730	-37.9%				

	Revenues (Thousands €)	Sector EV/Sales	Sector EV (Thousands €)	Unlevered Beta
MCPHY.PA	16,061	13.71	220,184	**0.996**

Comments

There are two main approaches to compute the WACC.

The first approach assumes that, when the value for net debt is negative, the unlevered beta corresponds to the levered beta. As it can be seen from the previous table, ALHRS.PA, GTT.PA, GWR.L, ITM.L and NEL.OL have a negative net debt, which implies also a negative D/E ratio. Therefore, these companies have an unlevered beta which is equal to their levered beta. The sector average unlevered beta becomes 0.996, which corresponds to McPhy's unlevered beta and McPhy's leveraged beta.

An unlevered beta of 0.996 suggests that McPhy's stock price is slightly less volatile compared to the overall market. Thence, the Company's stock price is expected to be a little bit less sensitive to changes in the market environment.

APPROACH 2

Identifier	Company Name	Country	Market Capitalization	Total Debt	Cash and Short Term Investments	Net Debt	Preferred Shareholders Equity	Minority Interest	Enterprise Value (EV)	Leverage (D/E)	Raw Beta (3 Year Weekly)	Tax Rate	Unlevered Beta	EV/Sales (LTM)
ALHRS.PA	Hydrogen Refueling Solutions SA	France	294,121	9,305	34,670	(25,365)	0	0	268,756	-8.6%	0.71	25%	0.76	13.53
GTT.PA	Gaztransport et Technigaz SA	France	3,700,420	4,046	212,847	(208,801)	0	41	3,491,660	-5.6%	0.26	25%	0.28	10.56
GWR.L	Ceres Power Holdings PLC	UK	673,648	3,124	182,320	(179,196)	0	0	494,452	-26.6%	1.91	25%	2.39	20.34
ITM.L	ITM Power PLC	UK	2,032,006	7,148	365,882	(358,734)	0	0	1,673,272	-17.7%	2.02	25%	2.33	46.79
NEL.OL	Nel ASA	Norway	21,659,872	224,424	3,125,758	(2,901,334)	0	0	18,758,538	-13.4%	1.32	22%	1.47	16.09
CCHE.PA	Seche Environment SA	France	705,624	701,681	129,472	572,209	0	7,286	1,285,119	80.3%	0.59	25%	0.37	1.47
DBG.PA	Derichebourg SA	France	656,718	976,600	323,200	653,400	0	5,000	1,315,118	98.7%	1.37	25%	0.79	0.34
RUBF.PA	Rubis SCA	France	2,532,658	2,311,564	805,353	1,506,211	0	126,826	4,165,695	56.6%	0.82	25%	0.57	0.56
Sector Average			**4,031,883**	**529,737**	**647,438**	**(117,701)**	**0**	**17,394**	**3,931,576**	**20.5%**	**1.13**	**24.6%**	**1.12**	**13.71**
Sector Min			294,121	3,124	34,670	(2,901,334)	0	0	268,756	-26.6%	0.26	22.0%	0.28	0.34
Sector Max			21,659,872	2,311,564	3,125,758	1,506,211	0	126,826	18,758,538	98.7%	2.02	25.0%	2.39	46.79
Sector Median			1,368,815	116,865	268,024	(102,281)	0	21	1,494,195	-7.1%	1.07	25.0%	0.78	12.04

Thousands € - Valuation Date

MCPHY.PA	McPhy Energy SA	France	341,136	6,057	135,463	(129,406)	0	0	211,730	-37.9%				

	Revenues (Thousands €)	Sector EV/Sales	Sector EV (Thousands €)	Unlevered Beta
MCPHY.PA	16,061	13.71	220,184	**1.121**

Comments

Differently from the first approach, the second approach does not worry about a negative net debt nor about a negative D/E ratio. Therefore, the second table computes the unlevered betas for all McPhy's comparables. This results in a sector average unlevered beta equal to 1.121, which corresponds to McPhy's unlevered beta.

In both cases, the use of a bottom-up beta (levered and unlevered betas) was preferred to the use of an historical beta (raw beta) because the former is less noisy and reflects the current operating and financial structure of the company.

Cost of Equity

Cost of Equity	Comments

Valuation Date: 31 December 2022

Color Coding
Hardcoded Value: Blue
Calculation: Black

APPROACH 1

Region	GDP (€)	GDP (Billions €)	CRP	Weights	Revenues (Thousands €)
France	2.64169E+12	2641.69	0.85%	56.5%	9,074
Germany	3.86705E+12	3867.05	0.00%	25.0%	4,015
Italy	1.90915E+12	1909.15	3.79%	18.4%	2,955
Total	8.41789E+12	8417.89		100%	16,061

McPhy Energy operates in three geographies: France, Germany and Italy. Therefore, the CRP was computed as the weighted average of each country's CRP (by Damodaran) and the relative revenues deriving from that geography (by Annual Report 2022).

Country Risk Premium	**1.18%**
Market Value of Equity at Valuation Date	341,136
Net Debt at Valuation Date	(129,406)
D/E at Valuation Date	**-37.93%**
Risk Free Rate (10Y France Government Bond)	**3.0%**
Unlevered Beta	0.996
Tax Rate (Source: Damodaran)	25%
Levered Beta	**0.996**
Market Risk Premium in France (Source: Damodaran)	**6.79%**
% of Domestic Revenues for McPhy	56.5%
% Export/GDP in France (Source: World Bank)	29.5%
% of Domestic Revenues for Average French Firm	70.6%
Lambda	**80.1%**
Levered Cost of Equity (Multifactor Model)	**10.71%**

According to the first approach, since McPhy's net debt is negative, which implies a negative D/E at valuation date, the levered beta is equal to its unlevered beta. They are both equal to 0.996.

The percentage of domestic revenues for the average French firm was computed as the percentage of French GDP coming from the domestic economy.

A multifactor model is better able to take into account the different exposures that firms have to country risk since country risk is treated as a separate risk factor with respect to market risk.

APPROACH 2

Region	GDP (€)	GDP (Billions €)	CRP	Weights	Revenues (Thousands €)
France	2.64169E+12	2641.69	0.85%	56.5%	9,074
Germany	3.86705E+12	3867.05	0.00%	25.0%	4,015
Italy	1.90915E+12	1909.15	3.79%	18.4%	2,955
Total	8.41789E+12	8417.89		100%	16,061

Country Risk Premium	**1.18%**
Market Value of Equity at Valuation Date	341,136
Net Debt at Valuation Date	(129,406)
D/E at Valuation Date	**-37.93%**
Risk Free Rate (10Y France Government Bond)	**3.0%**
Unlevered Beta	1.121
Tax Rate (Source: Damodaran)	25%
Re-Levered Beta	**0.802**
Market Risk Premium in France (Source: Damodaran)	**6.79%**
% of Domestic Revenues for McPhy	56.5%
% Export/GDP in France (Source: World Bank)	29.5%
% of Domestic Revenues for Average French Firm	70.6%
Lambda	**80.1%**
Levered Cost of Equity (Multifactor Model)	**9.39%**

According to the second approach, even if McPhy's net debt is negative, it becomes necessary to compute the re-levered beta, which will be the one to consider in the computation of the levered cost of equity. This leads to a levered beta equal to 0.802.

This new version of the cost of equity is slightly lower with respect to the case in which the unlevered beta is assumed to be equal to the levered beta.

Cost of Debt

Cost of Debt		Comments
Valuation Date: 31 December 2022		
Color Coding		
Hardcoded Value: Blue		
Calculation: Black		
SYNTHETIC RATINGS		There exist two approaches to compute the cost of debt.
Risk Free Rate (10Y France Government Bond)	**3.0%**	
		The first approach is based on Damodaran's considerations on synthetic ratings. When there is no public rating for a company, as is the case of McPhy, it is necessary to rely on synthetic ratings, for which a company's spread on debt can be determined based on its interest coverage ratio. Specifically, firms with an interest coverage ratio lower than 0.2 have a spread on debt equal to 20%. This leads to an after-tax cost of debt of 17.3% for McPhy.
EBIT	(38,391)	
Interest Expenses	314	
Interest Coverage Ratio	(122)	
Spread on Debt (Source: Damodaran)	**20.0%**	
Cost of Debt	**23.0%**	
Tax Rate (Source: Damodaran)	25.0%	
After-Tax Cost of Debt	**17.3%**	
		This extremely high after-tax cost of debt is biased by the fact that McPhy's EBIT is negative. Therefore, a different approach was followed to obtain a more consistent value.
INTEREST EXPENSES/TOTAL DEBT		
Interest Expenses	**314**	
Non-Current Financial Assets	12,857	
Deferred Tax Assets	66	
Current Tax Assets	1,101	The alternative to the previous approach consists in computing the cost of debt as the ratio between interest expenses and total debt.
Deferred Tax Liabilities	(688)	
Investment Subsidies	(2,500)	
Borrowings and Financial Debt Maturity > 1 Year	(4,505)	This gives rise to an after-tax cost of debt equal to 4.93% for McPhy, which seems a more consistent value with respect to 17.3%.
Borrowings and Financial Debt Maturing < 1 Year	(1,551)	
Total Debt	**4,780**	
Cost of Debt	**6.6%**	
Tax Rate (Source: Damodaran)	25.0%	
After-Tax Cost of Debt	**4.93%**	

Weighted Average Cost of Capital (WACC)

WACC		Comments
Valuation Date: 31 December 2022		
Color Coding		
Hardcoded Value: Blue		
Calculation: Black		
APPROACH 1		
Cost of Equity	**10.71%**	According to the first approach, the assumption of equivalence between the levered and the unlevered beta brings to the equivalence also between the cost of equity and the WACC. Therefore, in this case, McPhy's WACC becomes 10.71%.
WACC	**10.71%**	
APPROACH 2		
Cost of Equity	**9.39%**	
After-Tax Cost of Debt	**4.93%**	It was chosen to consider the after-tax cost of debt computed as the ratio between interest expenses and total debt because it seems more consistent with McPhy's fundamentals.
D/(D+E)	-61.1%	
E/(D+E)	161.1%	
WACC	**12.12%**	
		When the presence of a negative D/E ratio is ignored, McPhy's WACC is computed as the weighted average between its cost of equity and its after-tax cost of debt. The value obtained (12.12%) is slightly more conservative than the one obtained using the first approach.
		For the remaining of the analysis, especially for the discounting of the cash flows, it will be used a WACC equal to 10.71% (first approach).

FactSet Estimates

	Historicals		Explicit Forecast		
(Millions €)	**2021**	**2022**	**2023**	**2024**	**2025**
Data Retrieved on: 23 June 2023					
Color Coding					
Hardcoded Value: Blue					
Calculation: Black					
Current Price: €8.57					
Rating: Hold (1.80)					
Target Price: €13.42					
LT Growth Rate: 3%					
# of Analysts: 5					
Earnings per Share					
EPS	(0.85)	(1.46)	(1.48)	(1.58)	(1.27)
EPS - IFRS	(0.84)	(1.37)	(1.43)	(1.58)	(1.20)
EPS - ex. Extraordinary Items	(0.85)	(1.36)	(1.48)	(1.58)	(1.46)
Income Statement					
Sales	13.1	17.9	23.4	45.5	83.6
Cost of Sales	10.8	16.0	18.0	22.0	43.0
Gross Income	4.0	2.0	3.7	8.1	16.8
EBITDA	(15.5)	(36.8)	(37.8)	(40.1)	(30.6)
EBITDA - Adjusted		(36.7)	(38.0)	(43.0)	(27.8)
EBITDA - Reported	(15.5)	(36.3)	(35.0)	(40.0)	(17.6)
Depreciation and Amortization	4.2	2.3	2.8	4.0	3.3
EBIT	(23.5)	(38.4)	(42.1)	(45.7)	(38.5)
EBITA	(17.7)	(38.0)	(43.0)	(48.0)	(41.0)
EBIT - Adjusted	(23.5)	(38.4)	(42.6)	(45.4)	(42.7)
EBIT - Reported	(23.5)	(38.4)	(40.8)	(43.9)	(34.9)
Interest Expense	0.3	0.4	0.4	0.4	
Pretax Income	(23.5)	(38.2)	(41.3)	(45.7)	(38.2)
Pretax Income - Adjusted	(23.5)		(41.1)	(39.6)	(38.7)
Pretax Income - Reported	(23.5)		(41.1)	(39.6)	(37.7)
Tax Expense	0.0	0.0	(1.0)	(1.0)	(1.3)
Net Income	(23.6)	(38.2)	(39.4)	(42.3)	(35.4)
Net Income - Adjusted	(23.6)	(38.2)	(42.7)	(46.9)	(44.2)
Net Income - Reported	(23.6)	(38.2)	(40.1)	(44.0)	(35.9)
Balance Sheet					
Current Assets	193.0	168.0	108.0	53.0	15.0
Cash and Cash Equivalents	177.1	134.6	97.6	63.5	-30
Accounts Receivable	11.1	19	17.5	23	29
Inventories	4.2	12.0	12.0	13.0	15.0
Current Liabilities	25.9	63.9	64.0	64.0	64.0
Accounts Payable	6.9	18.0	12.5	13.6	18.0
Total Assets	204.8	208.8	190.1	179.0	111.0
Short-Term Debt		4.7	2.0	2.0	2.0
Long-Term Debt	4.0	6.0	5.0	5.0	5.0
Total Debt	4.6	4.6	4.6	4.6	
Intangible Assets	2.5	6.1	4.7	5.1	
Total Goodwill	2.5	2.5	2.7	2.7	2.8
Net Debt	(172.6)	(128.8)	(80.3)	(47.1)	13.1
Minority Interest	0.0	0.0	0.0	0.0	
Shareholder Equity	172.7	134.9	98.4	58.4	24.9
Cash Flow					
Capital Expenditures	5.1	15.6	33.2	25.9	8.2
Free Cash Flow	(16.9)	(59.8)	(59.5)	(52.6)	(34.1)
Cash Flow from Operations	(11.4)	(18.0)	(34.1)	(26.3)	(35.6)
Cash Flow from Investing	(5.1)	(23.0)	(20.0)	(5.0)	(10.0)
Cash Flow from Financing	(4.0)	0.0	0.0	0.0	0.0
Share Repurchase	0.0	0.0	0.0	0.0	0.0
Per Share					
EPS	(0.85)	(1.36)	(1.48)	(1.58)	(1.27)
EPS - IFRS	(0.84)	(1.37)	(1.43)	(1.58)	(1.20)
EPS - ex. Extraordinary Items	(0.85)	(1.36)	(1.48)	(1.58)	(1.46)
Dividends per Share	0.00	0.00	0.00	0.00	0.00
Free Cash Flow per Share	(0.60)	(0.80)	(2.00)	(1.90)	(1.50)
Cash Flow per Share	(0.70)	(0.60)	(1.57)	(1.08)	(1.39)
Book Value per Share	6.14	4.80	3.48	1.98	0.92
Valuation					
FCF Yield (%)	(2.8)	(17.5)	(24.8)	(22.0)	(14.2)
Dividend Yield (%)	0.0	0.0	0.0	0.0	0.0
Price/Book Value (x)	3.5	2.5	2.5	4.3	9.4
BV Growth (x)	(12.8)	(21.8)	(27.6)	(43.0)	(53.9)
Price/Book Value (x)	3.5	2.5	2.5	4.3	9.4
Price/Sales (x)	46.0	19.1	10.2	5.3	2.9
Enterprise Value/Sales (x)	32.9	11.8	4.7	2.4	1.3
Sales/Share (x)	0.5	0.6	0.8	1.6	3.0
ROA (%)	(11.5)	(18.3)	(20.7)	(23.6)	(31.9)
ROE (%)	(13.8)	(28.3)	(42.4)	(79.5)	(138.5)
Operating Return on Assets (%)	(0.1)	(0.2)	(0.2)	(0.2)	(0.3)
Operating Return on Shareholder's Equity (%)	(0.1)	(0.2)	(0.4)	(0.6)	(0.9)
Net Income Return on Assets (%)	(0.1)	(0.2)	(0.2)	(0.2)	(0.2)
Net Income Return on Shareholder's Equity (%)	(0.1)	(0.2)	(0.3)	(0.5)	(0.9)

Revenues Forecasts

Revenues Forecasts

(Thousands €)		Historicals 2019	2020	2021	2022	Explicit Forecast 2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	TV 2050
Color Coding																																	
Hardcoded Value: Blue																																	
Calculation: Black																																	
Revenues		11,387	13,694	13,130	16,061	23,400	45,500	83,600	108,680	135,850	163,020	195,624	234,749	269,961	310,455	357,024	410,577	451,635	496,798	546,478	601,126	649,216	681,677	715,761	751,549	789,126	828,582	870,012	913,512	959,188	1,007,147	1,057,279	1,073,386
	% Growth		20.3%	-4.1%	22.3%	45.7%	94.4%	83.7%	30.0%	25.0%	20.0%	20.0%	20.0%	15.0%	15.0%	15.0%	15.0%	10.0%	10.0%	10.0%	10.0%	8.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	1.5%
Revenues by Product																																	
Electrolysers (Large Capacity)		-	6,710	5,121	8,031	10,764	20,930	38,456	49,993	62,491	74,989	89,987	107,984	124,182	142,809	164,231	188,865	207,752	228,527	251,380	276,518	298,639	313,571	329,250	345,712	362,998	381,148	400,205	420,216	441,226	463,288	486,349	493,644
Electrolysers (Small Capacity)		-	1,506	2,101	2,891	3,510	6,825	12,540	16,302	20,378	24,453	29,344	35,212	40,494	46,568	53,554	61,587	67,745	74,520	81,972	90,169	97,382	102,252	107,364	112,732	118,369	124,287	130,502	137,027	143,878	151,072	158,592	160,971
Hydrogen Fueling Stations		-	5,478	5,909	5,140	9,126	17,745	32,604	42,385	52,962	63,578	76,293	91,552	105,285	121,078	139,239	160,125	176,138	193,751	213,126	234,439	253,194	265,854	279,147	293,104	307,759	323,147	339,305	356,270	374,083	392,787	412,339	418,524
Total		11,387	13,694	13,130	16,061	23,400	45,500	83,600	108,680	135,850	163,020	195,624	234,749	269,961	310,455	357,024	410,577	451,635	496,798	546,478	601,126	649,216	681,677	715,761	751,549	789,126	828,582	870,012	913,512	959,188	1,007,147	1,057,279	1,073,139
Revenues Growth by Product																																	
Electrolysers (Large Capacity)				-23.7%	56.8%	34.0%	94.4%	83.7%	30.0%	25.0%	20.0%	20.0%	20.0%	15.0%	15.0%	15.0%	15.0%	10.0%	10.0%	10.0%	10.0%	8.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	1.5%
Electrolysers (Small Capacity)				39.5%	37.6%	21.4%	94.4%	83.7%	30.0%	25.0%	20.0%	20.0%	20.0%	15.0%	15.0%	15.0%	15.0%	10.0%	10.0%	10.0%	10.0%	8.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	1.5%
Hydrogen Fueling Stations				7.9%	-13.0%	77.6%	94.4%	83.7%	30.0%	25.0%	20.0%	20.0%	20.0%	15.0%	15.0%	15.0%	15.0%	10.0%	10.0%	10.0%	10.0%	8.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	1.5%
Total			20.3%	-4.1%	22.3%	45.7%	94.4%	83.7%	30.0%	25.0%	20.0%	20.0%	20.0%	15.0%	15.0%	15.0%	15.0%	10.0%	10.0%	10.0%	10.0%	8.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	1.5%

1. Revenues by Product
2. Revenues by Region
3. Revenues by Type of Contract

Breakdown by Product

	Historicals 2019	2020	2021	2022	Average Weights	Annual Growth	CAGR	
Electrolysers (Large Capacity)	-	6,710	5,121	8,031		16.6%	9.4%	**Average Annual Growth**
% of Total Revenue		49%	39%	50%	46.0%			17.5%
% Growth			-23.7%	56.8%				
Electrolysers (Small Capacity)	-	1,506	2,101	2,891		38.5%	38.5%	
% of Total Revenue		11%	16%	18%	15.0%			**Average CAGR**
% Growth			39.5%	37.6%				14.9%
Hydrogen Fueling Stations	-	5,478	5,909	5,140		-2.6%	-3.1%	
% of Total Revenue		40%	45%	32%	39.0%			
% Growth			7.9%	-13.0%				
Total Revenues	**11,387**	**13,694**	**13,130**	**16,061**				

Breakdown by Region

	Historicals 2019	2020	2021	2022	Average Weights	Annual Growth	CAGR	
France	5,238	8,627	9,454	9,074		23.4%	20.1%	**Average Annual Growth**
% of Total Revenue	46.0%	63.0%	72.0%	56.5%	59.4%			43.5%
% Growth		64.7%	9.6%	-4.0%				
Germany	-	3,424	1,313	4,015		72.1%	8.3%	
% of Total Revenue		25.0%	10.0%	25.0%	20.0%			**Average CAGR**
% Growth			-61.6%	205.8%				20.8%
Italy	-	1,643	2,363	2,955		34.4%	34.1%	
% of Total Revenue		12.0%	18.0%	18.4%	16.1%			
% Growth			43.8%	25.0%				
Total Revenues	**11,387**	**13,694**	**13,130**	**16,061**				

Breakdown by Type of Contract

	Historicals 2019	2020	2021	2022	Average Weights	Annual Growth	CAGR	
Long-Term Contract	9,223	11,229	10,373	12,206		10.6%	9.8%	**Average Annual Growth**
% of Total Revenue	81%	82%	79%	76%	79.5%			16.2%
% Growth		21.7%	-7.6%	17.7%				
Short-Term Contract	2,164	2,465	2,757	3,855		21.9%	21.2%	
% of Total Revenue	19%	18%	21%	24%	20.5%			**Average CAGR**
% Growth		13.9%	11.9%	39.8%				15.5%
Total Revenues	**11,387**	**13,694**	**13,130**	**16,061**				

Comments

Revenues for the period 2023-2025 were retrieved from FactSet's consensus. FactSet's consensus was preferred to Refinitiv Workspace's consensus as the latter seemed too optimistic. The performed market analysis led to a CAGR of 19.2% for the electrolyser market between 2022 and 2050. McPhy's revenues 2022-2050 CAGR was fixed at 16.2%, slightly lower than the industry average for conservatism purposes. This CAGR was used to compute the nominal amount of revenues in 2050. Through the perpetual growth rate (1.5%), the nominal amount of revenues in 2049 was computed. To compute revenues for the years 2026-2028, decreasing growth rates were assumed, from 30% decreasing until 5%.

The annual growth applied to revenues is more conservative with respect to the one obtained by historicals.

These estimates are coherent with the market's expectations and analysts' consensus. At the same time, they avoid overestimating potential uptakes by McPhy.

Revenues are then split into electrolysers (small capacity), electrolysers (large capacity) and hydrogen fueling stations on the basis of the historical proportion of each.

Expenses Forecasts

Expenses Forecasts

(Thousands €)		Historicals 2019	2020	2021	2022	Explicit Forecast 2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	TV 2050
Color Coding																																	
Hardcoded Value: Blue																																	
Calculation: Black																																	
Operating Expenses																																	
Goods Consumed		5,787	7,711	10,425	16,025	19,529	30,548	42,486	37,499	27,170	32,604	39,125	46,950	53,992	62,091	71,405	82,115	90,327	99,360	109,296	120,225	129,843	136,335	143,152	150,310	157,825	165,716	174,002	182,702	191,838	201,429	211,456	214,676
	As % of Revenue	50.8%	56.3%	79.4%	99.8%	83.5%	67.1%	50.8%	34.5%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
Change in Stocks of Finished Products, Work in Progress		358	(353)	102	(125)	31	61	113	146	183	219	263	316	363	418	481	553	608	669	736	809	874	918	963	1,012	1,062	1,115	1,171	1,230	1,291	1,356	1,423	1,445
	As % of Revenue	3.1%	-2.6%	0.8%	-0.8%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Payroll Charges		7,149	8,883	11,631	17,654	22,044	35,715	52,486	51,156	42,600	40,753	48,906	58,687	67,490	77,614	89,256	102,644	112,919	124,200	136,620	150,281	162,304	170,419	178,940	187,887	197,282	207,146	217,503	228,378	239,797	251,787	264,320	268,345
	As % of Revenue	62.8%	64.9%	88.6%	109.9%	94.2%	78.5%	62.8%	47.1%	31.4%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
External Charges		6,007	5,921	7,835	21,038	24,549	35,868	44,102	28,990	20,378	24,453	29,344	35,212	40,494	46,568	53,554	61,587	67,745	74,520	81,972	90,169	97,382	102,252	107,364	112,732	118,369	124,287	130,502	137,027	143,878	151,072	158,592	161,007
	As % of Revenue	52.8%	43.2%	59.7%	131.0%	104.9%	78.8%	52.8%	26.7%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
Amortization		1,531	1,207	1,369	1,774	2,621	5,096	9,363	12,171	15,214	18,257	21,909	26,290	30,234	34,769	39,984	45,982	50,580	55,638	61,202	67,322	72,708	76,343	80,161	84,169	88,377	92,796	97,436	102,307	107,423	112,794	118,408	120,212
	As % of Revenue	13.4%	8.8%	11.5%	11.0%	11.2%	11.2%	11.2%	11.2%	11.2%	11.2%	11.2%	11.2%	11.2%	11.2%	11.2%	11.2%	11.2%	11.2%	11.2%	11.2%	11.2%	11.2%	11.2%	11.2%	11.2%	11.2%	11.2%	11.2%	11.2%	11.2%	11.2%	11.2%
Other Expenses																																	
Total Provisions		1,029	(43)	6,529	(222)	2,115	4,112	7,555	9,821	12,276	14,731	17,678	21,213	24,395	28,055	32,263	37,102	40,813	44,894	49,383	54,321	58,667	61,601	64,681	67,915	71,310	74,876	78,620	82,551	86,678	91,012	95,542	96,997
	As % of Revenue	9.0%	-0.3%	49.7%	-1.4%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%

Comments

All expenses are forecasted in terms of percentages of revenues.

Due to the scarcity of raw materials needed to produce hydrogen applications and infrastructure, goods consumed registered an increase in the last year, representing almost 100% of revenues. The scarcity of materials and their related high prices are expected to resist also in the coming years. However, it is believed that the Goods Consumed/Revenues ratio should stabilize in 2027 at around 20%, which is the percentage adopted for forecasting purposes. A percentage of this kind remains high in the overall framework, but this is coherent with the Company pertaining to the manufacturing business. Nevertheless, its negative impact on McPhy's profitability will be compensated by a reduction in CAPEX, as highlighted in the electrolyser market analysis.

Since the change in stocks for finished products varies from year to year, in order to make a consistent assumption, it was chosen to compute the historical average of Change in Stocks for Finished Products/Revenues and apply it to the forecasted period.

McPhy's payroll charges as a percentage of revenues are very high, even exceeding 100% in 2022. This is probably the result of an increase in headcount which is not outpaced by the increase in revenues. In the coming years, it is expected that McPhy will stabilize at around 25% in 2028. As it is common in the manufacturing business, the percentage of payroll charges over revenues is higher than the percentage of COGS over revenues. The percentage hereby chosen is higher than the typical percentage in the manufacturing business (around 18%) to avoid underestimating expenses.

External charges are another cost item which affects negatively McPhy's profitability. Indeed, as payroll charges, they were higher than 100% in 2022. McPhy's Annual Report 2022 explains that their significant increase in 2022 was due to the Group's commitment to structuring and developing its industrial, engineering and R&D activities. It is expected that these kinds of charges will decrease in the coming years, stabilizing at around 15% in 2027.

Total provisions are a non-core expense for McPhy. However, they play a role in supporting the core activities of the business. Since these expenses varied a lot in the past years, it is expected that the ratio Total Provisions/Revenues will be equal to the 2019 value.

Taxes Forecasts

Taxes Forecasts

(Thousands €)	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	Historicals				Explicit Forecast																											TV
Color Coding																																
Hardcoded Value: Blue																																
Calculation: Black																																
Tax Rate in France	28.0%	28.0%	26.5%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Non-Core Tax Adjustments	179	3,353	148	275	989	989	989	989	989	989	989	989	989	989	989	989	989	989	989	989	989	989	989	989	989	989	989	989	989	989	989	989
As % of EBIT	1.9%	34.7%	0.8%	0.7%	2.2%	1.6%	1.5%	4.6%	3.3%	2.1%	1.8%	1.5%	1.3%	1.1%	1.0%	0.8%	0.8%	0.7%	0.6%	0.6%	0.5%	0.5%	0.5%	0.5%	0.5%	0.4%	0.4%	0.4%	0.4%	0.4%	0.3%	0.3%
Financial Tax Adjustments	(1,986)	(6,015)	(6,404)	(9,887)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)
As % of EBIT	21.0%	62.2%	34.9%	24.5%	13.4%	9.8%	9.4%	28.5%	20.0%	13.0%	10.8%	9.0%	7.8%	6.8%	5.9%	5.2%	4.7%	4.3%	3.9%	3.5%	3.3%	3.1%	3.0%	2.8%	2.7%	2.6%	2.4%	2.3%	2.2%	2.1%	2.0%	2.0%
Taxes and Duties	(89)	(101)	(128)	(190)	(190)	(190)	(190)	(190)	(190)	(190)	(190)	(190)	(190)	(190)	(190)	(190)	(190)	(190)	(190)	(190)	(190)	(190)	(190)	(190)	(190)	(190)	(190)	(190)	(190)	(190)	(190)	(190)
As % of EBIT	0.9%	1.0%	0.7%	0.5%	0.4%	0.3%	0.3%	0.9%	0.6%	0.4%	0.3%	0.3%	0.2%	0.2%	0.2%	0.2%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%

Comments

There is no reason to assume a tax rate change in France in the coming years, so a 25% tax rate will be used for the computation of all statutory taxes (core, non-core and financial) until 2050.

Since there are not enough elements to precisely estimate future eventual non-core and financial tax adjustments, they are assumed to be equal to the historical average between 2019 and 2022.

Taxes and duties refer to various taxes and duties imposed by governmental authorities, such as Value-Added Tax (VAT), customs duties or other regulatory fees. It is possible to see that, while the tax rate for the computation of statutory taxes decreased over the historical period of reference, taxes and duties increased (in nominal amount). This leads to the belief that they will remain approximately equal to those of 2022 also for the coming years.

Even though non-core tax adjustments, financial tax adjustments and taxes and duties were estimated in nominal amounts, it was chosen to report also their value as a percentage of EBIT (Core Result Before Taxes) to evaluate the Company's efficiency of tax management and the impact of tax obligations on profitability. Historically, taxes and duties represented a very low percentage of total EBIT. The same is valid also for non-core tax adjustments, apart from 2020. Conversely, financial tax adjustments represented a consistent part of EBIT due to the significant amounts of non-capitalized losses each year.

Income and Charges Forecasts

Income and Charges Forecasts

(Thousands €)	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	Historicals				Explicit Forecast																											TV
Color Coding																																
Hardcoded Value: Blue																																
Calculation: Black																																
Income Items																																
Other Income from Operating Activities	4,076	947	1,483	1,881	2,741	5,329	9,791	12,728	15,910	19,092	22,911	27,493	31,617	36,359	41,813	48,085	52,894	58,183	64,001	70,401	76,034	79,835	83,827	88,018	92,419	97,040	101,892	106,987	112,336	117,953	125,824	125,710
As % of Revenues	55.8%	6.9%	11.3%	11.7%	11.7%	11.7%	11.7%	11.7%	11.7%	11.7%	11.7%	11.7%	11.7%	11.7%	11.7%	11.7%	11.7%	11.7%	11.7%	11.7%	11.7%	11.7%	11.7%	11.7%	11.7%	11.7%	11.7%	11.7%	11.7%	11.7%	11.7%	11.7%
Income from Cash and Cash Equivalents	480	45	165	701	142	45	83	108	134	161	194	232	267	307	353	406	447	492	541	595	643	763	884	1,012	1,168	1,337	1,537	1,748	2,006	2,265	2,615	2,945
As % of Cash and Cash Equivalents	3.7%	0.0%	0.1%	0.5%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
Other Comprehensive Income	73	(21)	81	(93)	31	60	110	143	179	214	257	308	355	408	469	539	593	653	718	790	853	896	941	988	1,037	1,089	1,143	1,200	1,260	1,323	1,389	1,410
As % of Revenues	0.6%	-0.2%	0.6%	-0.6%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Actuarial Gains or (Loss) on Pension Obligations	(12)	4	43	77	(3)	(10)	(18)	(23)	(29)	(35)	(42)	(50)	(58)	(66)	(76)	(88)	(97)	(106)	(117)	(129)	(139)	(146)	(153)	(161)	(169)	(177)	(186)	(196)	(205)	(216)	(226)	(230)
As % of Other Comprehensive Income	-16.4%	-19.0%	53.1%	-82.8%	-16.3%	-16.3%	-16.3%	-16.3%	-16.3%	-16.3%	-16.3%	-16.3%	-16.3%	-16.3%	-16.3%	-16.3%	-16.3%	-16.3%	-16.3%	-16.3%	-16.3%	-16.3%	-16.3%	-16.3%	-16.3%	-16.3%	-16.3%	-16.3%	-16.3%	-16.3%	-16.3%	-16.3%
Currency Translation Adjustments	82	(24)	49	(149)	34	67	123	160	200	240	287	345	397	456	525	603	668	730	803	883	954	1,002	1,053	1,104	1,160	1,218	1,278	1,342	1,409	1,480	1,554	1,577
As % of Other Comprehensive Income	112.3%	114.3%	60.5%	160.2%	111.8%	111.8%	111.8%	111.8%	111.8%	111.8%	111.8%	111.8%	111.8%	111.8%	111.8%	111.8%	111.8%	111.8%	111.8%	111.8%	111.8%	111.8%	111.8%	111.8%	111.8%	111.8%	111.8%	111.8%	111.8%	111.8%	111.8%	111.8%
Deferred Taxes Recognized as Equity	3	(1)	(11)	(21)	1	3	5	6	8	10	11	14	16	18	21	24	27	29	32	35	38	40	42	44	46	49	51	54	56	59	62	63
As % of Other Comprehensive Income	4.1%	4.8%	-13.6%	22.6%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%
Charges Items																																
Non-Current Operating Income and Charges	(64)	(236)	31	(57)	(83)	(161)	(297)	(386)	(482)	(579)	(694)	(833)	(958)	(1,102)	(1,267)	(1,457)	(1,603)	(1,763)	(1,939)	(2,133)	(2,304)	(2,419)	(2,540)	(2,667)	(2,801)	(2,941)	(3,088)	(3,242)	(3,404)	(3,574)	(3,752)	(3,809)
As % of Revenues	-0.6%	-1.7%	0.2%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%
Cost of Gross Financial Debt	(110)	(298)	(206)	(314)	379	0	(2,569)	(10,723)	(16,090)	(18,559)	(19,153)	(19,223)	(18,690)	(17,634)	(15,718)	(12,907)	(8,947)	(3,306)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
As % of Total Debt Previous Year		12.9%	3.0%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%

Comments

All these items pertain to the non-core business segment or the financial business segment. Thence, their estimation is slightly less relevant with respect to the one of revenues and expenses (core business items).

A key component of the item "Other Income from Operating Activities" are Research Tax Credits (CIRs), which are typical of firms taxed on actual income and investing in research. Since McPhy is expected to continue investing in research (see Expenses Forecasts), it is expected that CIRs will be considerable also in the next decades. A 11.7% ratio between other income from operating activities and revenues is assumed for the computations.

Historically, income from cash and cash equivalents has been relatively low compared to the total amount of cash and cash equivalents held by McPhy. Based on these historical figures, a reasonable assumption going forward would be a continuation of the low percentages, equal to 0.2%.

Other comprehensive income is forecasted in terms of revenues. Specifically, since it seemed to oscillate between +0.6% and -0.6% during the historical period, it was considered the historical average (0.1%) going forward. It was then split into its three main components by assuming that the percentage of each one will remain equal to the historical average.

The Annual Report 2022 says that "Non-current operating income and charges correspond to unusual items related to income and expenses that are not usual in their frequency, nature, or amount, which the Company reports separately in its income statement to facilitate understanding of current operating performance". To determine the value driver for non-current operating income and charges, it was chosen to divide it by McPhy's revenues. This analysis provides an assessment between these unusual items and McPhy's revenue generation. These ratios have fluctuated around zero or slightly negative values in the past years. The value for 2022 is assumed to be valid also for the following years.

For the cost of gross financial debt, since it is a financial caption and has no direct impact on valuation, it is assumed the historical average.

Assets Forecasts

Assets Forecasts

(Thousands €)	Historicals 2019	2020	2021	2022	Explicit Forecast 2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	TV 2050
Color Coding																																
Hardcoded Value: Blue																																
Calculation: Black																																
Cash																																
Operating Cash	650	9,884	8,858	6,773	10,970	21,330	39,191	50,948	65,685	76,422	91,706	110,047	126,554	145,537	167,368	192,473	211,721	232,893	256,182	281,800	304,344	319,561	335,539	352,316	369,932	388,429	407,850	428,243	449,655	472,137	495,639	505,187
As % of Revenue	5.7%	72.2%	67.5%	42.2%	46.9%	46.9%	46.9%	46.9%	46.9%	46.9%	46.9%	46.9%	46.9%	46.9%	46.9%	46.9%	46.9%	46.9%	46.9%	46.9%	46.9%	46.9%	46.9%	46.9%	46.9%	46.9%	46.9%	46.9%	46.9%	46.9%	46.9%	46.9%
Excess of Cash	12,345	187,790	168,297	128,690	56,114	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	41,787	85,320	126,803	183,268	244,638	320,209	399,840	500,571	610,179	743,096	891,779
Intangible Assets																																
Goodwill	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487
As % of Revenue	21.8%	18.2%	18.9%	15.5%	10.6%	5.5%	3.0%	2.3%	1.8%	1.5%	1.5%	1.1%	0.9%	0.8%	0.7%	0.6%	0.6%	0.5%	0.5%	0.4%	0.4%	0.4%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.2%	0.2%	0.2%
Other Intangible Non-Current Assets	157	178	3,638	7,601	8,797	17,105	31,428	40,856	51,070	61,284	73,541	88,249	101,486	116,709	134,215	154,348	169,782	186,761	205,437	225,980	244,059	256,262	269,075	282,529	296,655	311,488	327,062	343,415	360,586	378,615	397,461	405,514
As % of Revenue	1.4%	1.3%	27.9%	47.3%	37.6%	37.6%	37.6%	37.6%	37.6%	37.6%	37.6%	37.6%	37.6%	37.6%	37.6%	37.6%	37.6%	37.6%	37.6%	37.6%	37.6%	37.6%	37.6%	37.6%	37.6%	37.6%	37.6%	37.6%	37.6%	37.6%	37.6%	37.6%
Concession, Patent, Licenses	157	150	192	362	4,294	8,349	15,340	19,942	24,927	29,912	35,895	43,074	49,535	56,965	65,510	75,337	82,870	91,157	100,273	110,300	119,124	125,080	131,334	137,901	144,796	152,036	159,638	167,620	176,001	184,801	193,999	196,954
As % of Other Intangible Non-Current Assets	100.0%	85.2%	5.2%	4.8%	48.8%	48.8%	48.8%	48.8%	48.8%	48.8%	48.8%	48.8%	48.8%	48.8%	48.8%	48.8%	48.8%	48.8%	48.8%	48.8%	48.8%	48.8%	48.8%	48.8%	48.8%	48.8%	48.8%	48.8%	48.8%	48.8%	48.8%	48.8%
Capitalized Development Expenses	0	26	3,369	6,208	4,146	8,063	14,814	19,258	24,073	28,887	34,664	41,597	47,837	55,012	63,264	72,754	80,029	88,032	96,835	106,519	115,041	120,793	126,832	133,174	139,833	146,824	154,165	161,874	169,967	178,466	187,389	190,202
As % of Other Intangible Non-Current Assets	0.0%	14.8%	92.1%	81.7%	47.1%	47.1%	47.1%	47.1%	47.1%	47.1%	47.1%	47.1%	47.1%	47.1%	47.1%	47.1%	47.1%	47.1%	47.1%	47.1%	47.1%	47.1%	47.1%	47.1%	47.1%	47.1%	47.1%	47.1%	47.1%	47.1%	47.1%	47.1%
Other	0	0	97	1,031	357	693	1,274	1,656	2,070	2,484	2,981	3,576	4,114	4,731	5,441	6,257	6,883	7,571	8,328	9,161	9,894	10,389	10,908	11,454	12,026	12,628	13,259	13,922	14,618	15,349	16,113	16,358
As % of Other Intangible Non-Current Assets	0.0%	0.0%	2.7%	13.6%	4.1%	4.1%	4.1%	4.1%	4.1%	4.1%	4.1%	4.1%	4.1%	4.1%	4.1%	4.1%	4.1%	4.1%	4.1%	4.1%	4.1%	4.1%	4.1%	4.1%	4.1%	4.1%	4.1%	4.1%	4.1%	4.1%	4.1%	4.1%
Tangible Non-Current Assets																																
Beginning Balance PPE	9,152	10,756	12,007	13,410	25,412	41,805	71,556	122,315	183,225	253,019	329,157	411,386	499,097	597,443	707,641	831,034	969,100	1,116,755	1,274,534	1,442,987	1,622,670	1,810,663	2,001,688	2,195,579	2,392,144	2,591,166	2,792,399	2,995,567	3,200,361	3,406,435	3,613,405	3,820,800
Acquisitions	328	648	1,560	12,148	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lease Agreements	1,540	954	937	2,777	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Disposals/Internal Transfer	(264)	(551)	(1,094)	(2,923)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CAPEX	1,604	1,251	1,403	12,002	16,393	29,751	50,759	60,910	69,793	76,138	82,229	87,711	98,346	110,198	123,393	138,066	147,654	157,779	168,453	179,683	187,993	191,025	193,891	196,565	199,022	201,233	203,168	204,794	206,074	206,970	207,396	200,528
CAPEX As % of Revenue	14.1%	9.1%	10.7%	74.7%	70.1%	65.4%	60.7%	56.0%	51.4%	46.7%	42.0%	37.4%	36.4%	35.5%	34.6%	33.6%	32.7%	31.8%	30.8%	29.9%	29.0%	28.0%	27.1%	26.2%	25.2%	24.5%	23.4%	22.4%	21.5%	20.6%	19.6%	18.7%
Accumulated Amortizations and Impairments	7,947	8,251	8,374	7,361	18,414	30,293	51,850	88,631	132,767	183,340	238,511	298,095	361,631	432,914	512,764	602,176	702,221	809,213	923,541	1,045,604	1,175,804	1,312,026	1,450,445	1,590,940	1,733,373	1,877,587	2,025,405	2,170,621	2,319,017	2,468,340	2,618,312	2,768,594
Accumulated Amortization and Impairments As % of Beginning Balance PPE	86.8%	76.7%	71.4%	54.9%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%
Final Balance PPE	2,869	3,756	4,836	18,051	23,392	41,264	70,465	94,595	120,252	145,817	172,875	201,002	235,792	274,727	318,269	366,924	414,534	465,321	519,445	577,066	634,859	689,662	745,134	801,203	857,792	914,812	972,165	1,029,740	1,087,418	1,145,065	1,202,488	1,252,735
Inventories and Accounts Receivables																																
Inventories	1,940	2,841	4,252	12,015	12,165	19,057	26,493	23,411	17,011	20,413	24,496	29,395	33,865	38,875	44,707	51,413	56,554	62,209	68,430	75,273	81,295	85,360	89,628	94,109	98,815	103,756	108,945	114,391	120,110	126,116	132,393	134,409
Average Holding Period	115	141	147	276	227	227	227	227	227	227	227	227	227	227	227	227	227	227	227	227	227	227	227	227	227	227	227	227	227	227	227	227
Trade and Other Receivables	7,714	12,019	11,131	19,118	25,997	46,940	79,613	94,875	107,815	116,444	124,211	130,429	126,574	123,228	113,386	97,818	71,767	78,943	86,838	95,521	103,163	108,321	113,710	119,424	125,395	131,685	138,248	145,161	152,410	160,040	168,096	170,565
Average Collection Period	247	320	309	434	406	377	348	319	290	261	232	203	174	145	116	87	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58

Comments

It was assumed that operating cash in the following decades will maintain a ratio with revenues equal to the average of the historical period (46.9%).

McPhy's goodwill relates to the acquisition of McPhy Italy in 2013. Since then, no additional company acquisitions were conducted. This is in line with market dynamics in the hydrogen industry, which does not show a high number of merger and acquisition activities. As a proof of this, an analysis of M&A activities in the hydrogen business was conducted on Refinitiv Workspace. I selected 115 companies operating in the hydrogen space (electrolyser manufacturers, fuel cell producers and related component manufacturers) and analyzed their M&A activities in the period between 2017 and 2022 (6 years of data). If they had conducted at least one M&A activities in a given year, they received a dummy value of 1; otherwise, they received a value of 0. The average of these 0 and 1 values resulted in 0.059. This means that M&A activities have been very uncommon in the industry in the period considered. On the basis of this market analysis and of McPhy's historical acquisition strategy, it was assumed that goodwill will remain constant in the future in nominal terms

Other intangible non-current assets were forecasted as percentages of revenues. They were then split into their main three components assuming that the relative proportions between them will remain equal to the historical averages.

Tangible non-current assets have been estimated via amortization and CAPEX. First, their amount (Final Balance PPE) was split into its components: Initial Balance PPE, CAPEX and Accumulated Amortizations and Impairments. Second, CAPEX was forecasted as a percentage of revenues. Specifically, in the Annual Report 2022, McPhy declares that it aims to reduce CAPEX by 50% by 2030. From this declaration, it was computed the CAPEX/Revenues ratio as of 2030, equal to 37.4%. A further decrease by 50% was then assumed until 2050, which is in line with the market analysis on electrolyser systems costs, leading to a ratio of 18.7%. Third, Accumulated Amortizations and Impairments were forecasted as a percentage of Initial Balance PPE. Since the Accumulated Amortizations and Impairments/Initial Balance PPE ratios were rather constant during the historical period, their average was assumed to be valid also for the coming years. These steps allowed to forecast the Final Balance PPE until 2050.

Inventories were forecasted on the basis of the average holding ratio. According to an external research, the inventory ratio in the durable goods manufacturing sector ranged between 1.40 and 1.82. Taking the mean of this range, the average holding period was assumed to be equal to 227 days. The nominal amount of inventories in 2023 is very similar to the one of 2022, despite the increase in revenues and COGS. This explains that the very high value in 2022 was due to the anticipated procurement of some critical components.

The average receivables turnover in the industrial and machinery industry is equal to 58 days. Therefore, it was assumed that McPhy's average collection period will stabilize at 58 days. However, since the current collection period is very high and the company still does not have negotiating power, 12 transition years will be needed to reach this average collection period.

Liabilities Forecasts

Liabilities Forecasts

(Thousands €)	Historicals 2019	2020	2021	2022	Explicit Forecast 2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	TV 2050
Color Coding																																
Hardcoded Value: Blue																																
Calculation: Black																																
Non-Core Liabilities																																
Provisions < 1 Year	(584)	(499)	(6,504)	(5,651)	(5,469)	(12,710)	(28,430)	(32,746)	(39,206)	(49,283)	(60,263)	(70,457)	(80,922)	(93,927)	(108,036)	(123,682)	(136,184)	(150,024)	(164,949)	(181,329)	(195,902)	(205,734)	(215,989)	(226,774)	(238,131)	(250,040)	(262,534)	(275,660)	(289,447)	(303,919)	(319,045)	(323,904)
As % of Revenues	5.1%	3.6%	49.5%	35.2%	23.4%	27.9%	34.0%	30.1%	28.9%	30.2%	30.8%	30.0%	30.0%	30.3%	30.3%	30.1%	30.2%	30.2%	30.2%	30.2%	30.2%	30.2%	30.2%	30.2%	30.2%	30.2%	30.2%	30.2%	30.2%	30.2%	30.2%	30.2%
Provisions > 1 Year	(750)	(1,216)	(2,158)	(2,482)	(2,791)	(6,028)	(11,985)	(14,934)	(18,085)	(22,268)	(26,923)	(31,570)	(36,683)	(42,400)	(48,758)	(55,963)	(61,572)	(67,785)	(74,546)	(81,977)	(88,547)	(92,984)	(97,626)	(102,504)	(107,633)	(113,016)	(118,665)	(124,596)	(130,828)	(137,370)	(144,207)	(146,403)
As % of Revenues	6.6%	8.9%	16.7%	15.5%	11.9%	13.2%	14.3%	13.7%	13.3%	13.7%	13.8%	13.6%	13.6%	13.7%	13.7%	13.6%	13.6%	13.6%	13.6%	13.6%	13.6%	13.6%	13.6%	13.6%	13.6%	13.6%	13.6%	13.6%	13.6%	13.6%	13.6%	13.6%
Other Current Liabilities	(2,990)	(7,160)	(11,546)	(38,230)	(12,985)	(25,249)	(46,392)	(60,310)	(75,388)	(90,465)	(108,558)	(130,270)	(149,810)	(172,282)	(198,124)	(227,843)	(250,627)	(275,689)	(303,258)	(333,584)	(360,271)	(378,285)	(397,199)	(417,059)	(437,912)	(459,807)	(482,798)	(506,937)	(532,284)	(558,899)	(586,719)	(595,653)
As % of Revenues	26.3%	52.3%	87.9%	236.0%	55.5%	55.5%	55.5%	55.5%	55.5%	55.5%	55.5%	55.5%	55.5%	55.5%	55.5%	55.5%	55.5%	55.5%	55.5%	55.5%	55.5%	55.5%	55.5%	55.5%	55.5%	55.5%	55.5%	55.5%	55.5%	55.5%	55.5%	55.5%
Accounts Payables																																
Trade and Other Payables	4,881	6,027	6,682	19,223	16,600	25,977	36,132	31,947	25,213	27,856	33,427	40,113	46,130	53,049	61,006	70,157	77,173	84,890	93,379	102,717	110,935	116,481	122,305	128,421	134,842	141,584	148,663	156,096	163,901	172,096	180,662	183,414
Average Payable Period	290	299	232	418	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310

Comments

Provisions and other current liabilities were forecasted as a percentage of revenues. The historical averages were considered and brought forward. The value of other current liabilities for 2022 seems very high, but no explanation about it is provided in the Company's annual reports. Thence, it was excluded from the computation of the average to avoid introducing a bias in the estimates.

Trade and other payables were forecasted based on McPhy's average payable period. Since no information was provided by the Company, it was assumed the historical average as the future average payable period (310 days).

Financial Items Forecasts

Financial Items Forecasts

(Thousands €)	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	Historicals				Explicit Forecast																											TV
Color Coding																																
Hardcoded Value: Blue																																
Calculation: Black																																
Total Debt	**(2,311)**	**(6,815)**	**(3,981)**	**4,780**	**0**	**(32,379)**	**(135,138)**	**(302,778)**	**(233,885)**	**(241,278)**	**(242,257)**	**(235,537)**	**(222,226)**	**(198,080)**	**(162,659)**	**(112,751)**	**(41,667)**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Borrowings and Financial Debt Maturing < 1 Year	(1,088)	(4,918)	(1,663)	(1,531)	0	(15,758)	(65,763)	(98,682)	(113,821)	(117,467)	(117,895)	(114,625)	(108,147)	(96,396)	(79,158)	(54,870)	(20,277)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
As % of Total Debt	47.1%	72.2%	26.8%	-32.4%	48.7%	48.7%	48.7%	48.7%	48.7%	48.7%	48.7%	48.7%	48.7%	48.7%	48.7%	48.7%	48.7%	48.7%	48.7%	48.7%	48.7%	48.7%	48.7%	48.7%	48.7%	48.7%	48.7%	48.7%	48.7%	48.7%	48.7%	48.7%
Borrowings and Financial Debt Maturity > 1 Year	(1,784)	(2,463)	(3,518)	(4,503)	0	(21,770)	(90,861)	(136,339)	(157,254)	(162,992)	(162,883)	(158,365)	(149,415)	(133,180)	(109,365)	(75,809)	(28,015)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
As % of Total Debt	77.2%	36.1%	88.4%	-94.2%	67.2%	67.2%	67.2%	67.2%	67.2%	67.2%	67.2%	67.2%	67.2%	67.2%	67.2%	67.2%	67.2%	67.2%	67.2%	67.2%	67.2%	67.2%	67.2%	67.2%	67.2%	67.2%	67.2%	67.2%	67.2%	67.2%	67.2%	67.2%
Investment Subsidies	0	0	0	(2,500)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
As % of Total Debt	0.0%	0.0%	0.0%	-52.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Deferred Tax Liabilities	(577)	(609)	(640)	(680)	0	(5,398)	(22,514)	(33,783)	(38,965)	(40,214)	(40,360)	(39,241)	(37,023)	(33,000)	(27,099)	(18,784)	(6,942)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
As % of Total Debt	25.0%	8.9%	16.1%	-14.4%	16.7%	16.7%	16.7%	16.7%	16.7%	16.7%	16.7%	16.7%	16.7%	16.7%	16.7%	16.7%	16.7%	16.7%	16.7%	16.7%	16.7%	16.7%	16.7%	16.7%	16.7%	16.7%	16.7%	16.7%	16.7%	16.7%	16.7%	16.7%
Non-Current Financial Assets	316	340	420	12,857	0	3,153	13,159	19,746	22,775	23,504	23,596	22,936	21,640	19,288	15,859	10,979	4,057	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
As % of Total Debt	-13.7%	-5.0%	-10.6%	269.0%	-9.7%	-9.7%	-9.7%	-9.7%	-9.7%	-9.7%	-9.7%	-9.7%	-9.7%	-9.7%	-9.7%	-9.7%	-9.7%	-9.7%	-9.7%	-9.7%	-9.7%	-9.7%	-9.7%	-9.7%	-9.7%	-9.7%	-9.7%	-9.7%	-9.7%	-9.7%	-9.7%	-9.7%
Current Tax Assets	746	748	696	1,101	0	6,558	27,361	41,055	47,353	48,878	49,048	47,688	44,993	40,104	32,933	22,828	8,436	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
As % of Total Debt	-32.3%	-11.0%	-17.5%	23.0%	-20.2%	-20.2%	-20.2%	-20.2%	-20.2%	-20.2%	-20.2%	-20.2%	-20.2%	-20.2%	-20.2%	-20.2%	-20.2%	-20.2%	-20.2%	-20.2%	-20.2%	-20.2%	-20.2%	-20.2%	-20.2%	-20.2%	-20.2%	-20.2%	-20.2%	-20.2%	-20.2%	-20.2%
Deferred Tax Assets	76	87	126	66	0	834	3,482	5,225	6,027	6,220	6,243	6,069	5,726	5,104	4,191	2,905	1,074	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
As % of Total Debt	-3.3%	-1.3%	-3.2%	1.4%	-2.6%	-2.6%	-2.6%	-2.6%	-2.6%	-2.6%	-2.6%	-2.6%	-2.6%	-2.6%	-2.6%	-2.6%	-2.6%	-2.6%	-2.6%	-2.6%	-2.6%	-2.6%	-2.6%	-2.6%	-2.6%	-2.6%	-2.6%	-2.6%	-2.6%	-2.6%	-2.6%	-2.6%

Comments

Total Debt includes Non-Current Financial Assets, Current Tax Assets, Deferred Tax Assets, Borrowing and Financial Debt (with long and short maturities), Investment Subsidies and Deferred Tax Liabilities. Similarly to Excess of Cash, Total Debt is forecasted as a residual. Specifically, if the sum of core invested capital and non-core invested capital is lower than equity, then Total Debt is equal to 0. Conversely, it is equal to the difference between the sum of core and non-core invested capital and equity. These computations can be analyzed in the sheet "Output Balance Sheet". After having computed Total Debt, it was split in its core components by assuming that the value of each one as a percentage of Total Debt will be equal to the historical average (excluding year 2022 because it is a special situation in which Total Debt is positive and Net Debt is negative).

Output Income Statement

Output Income Statement

(Thousands €)	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	Historicals				Explicit Forecast																											TV
Color Coding																																
Hardcoded Value: Blue																																
Calculation: Black																																
CORE BUSINESS																																
Revenues	11,387	13,694	13,130	16,061	23,400	45,500	83,600	108,680	135,850	163,020	195,624	234,749	269,961	310,455	357,024	410,577	451,635	496,798	546,478	601,126	649,216	681,677	715,761	751,549	789,126	828,582	870,012	913,512	959,188	1,007,147	1,057,279	1,073,380
% Change		20.3%	-4.1%	22.3%	45.7%	94.4%	83.7%	30.0%	25.0%	20.0%	20.0%	20.0%	15.0%	15.0%	15.0%	15.0%	10.0%	10.0%	10.0%	10.0%	8.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	1.5%
Goods Consumed	(5,787)	(7,711)	(10,425)	(16,025)	(19,529)	(30,548)	(42,486)	(37,498)	(27,170)	(32,604)	(39,125)	(46,950)	(53,992)	(62,091)	(71,405)	(82,115)	(90,327)	(99,360)	(109,296)	(120,225)	(129,843)	(136,335)	(143,152)	(150,310)	(157,825)	(165,716)	(174,002)	(182,702)	(191,838)	(201,429)	(211,456)	(214,676)
Change in Stocks of Finished Products, Work in Progress	(355)	353	(102)	125	(31)	(61)	(115)	(146)	(183)	(219)	(263)	(316)	(363)	(418)	(481)	(553)	(608)	(669)	(736)	(809)	(874)	(918)	(963)	(1,012)	(1,062)	(1,115)	(1,171)	(1,230)	(1,291)	(1,356)	(1,423)	(1,445)
Payroll Charges	(7,149)	(8,883)	(11,631)	(17,654)	(22,044)	(35,715)	(52,486)	(51,156)	(42,600)	(40,755)	(48,906)	(58,687)	(67,490)	(77,614)	(89,256)	(102,644)	(112,909)	(124,200)	(136,620)	(150,281)	(162,304)	(170,419)	(178,940)	(187,887)	(197,282)	(207,146)	(217,503)	(228,378)	(239,797)	(251,787)	(264,320)	(268,345)
External Charges	(6,007)	(5,921)	(7,835)	(21,038)	(24,549)	(35,868)	(44,102)	(28,990)	(20,578)	(24,453)	(29,344)	(35,212)	(40,494)	(46,568)	(53,554)	(61,587)	(67,745)	(74,520)	(81,972)	(90,169)	(97,382)	(102,252)	(107,364)	(112,732)	(118,369)	(124,287)	(130,502)	(137,027)	(143,878)	(151,072)	(158,592)	(161,007)
Amortization	(1,531)	(1,267)	(1,569)	(1,774)	(2,621)	(5,096)	(9,363)	(12,171)	(15,214)	(18,257)	(21,909)	(26,290)	(30,234)	(34,769)	(39,984)	(45,982)	(50,580)	(55,638)	(61,202)	(67,322)	(72,708)	(76,343)	(80,161)	(84,169)	(88,377)	(92,796)	(97,436)	(102,307)	(107,423)	(112,794)	(118,408)	(120,212)
Total Costs	**(20,829)**	**(23,369)**	**(31,502)**	**(56,366)**	**(68,774)**	**(107,289)**	**(148,549)**	**(129,961)**	**(105,544)**	**(116,289)**	**(139,546)**	**(167,456)**	**(192,574)**	**(221,460)**	**(254,679)**	**(292,881)**	**(322,169)**	**(354,386)**	**(389,824)**	**(428,807)**	**(463,111)**	**(486,267)**	**(510,380)**	**(536,389)**	**(562,915)**	**(591,061)**	**(620,414)**	**(651,444)**	**(684,226)**	**(718,438)**	**(754,199)**	**(765,684)**
% Change		12.2%	34.8%	78.9%	22.0%	56.0%	38.5%	-12.5%	-18.8%	10.2%	20.0%	20.0%	15.0%	15.0%	15.0%	15.0%	10.0%	10.0%	10.0%	10.0%	8.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	1.5%
Core Result Before Taxes	**(9,442)**	**(9,675)**	**(18,372)**	**(40,305)**	**(45,374)**	**(61,789)**	**(64,949)**	**(21,281)**	**30,306**	**46,731**	**56,078**	**67,293**	**77,387**	**88,995**	**102,345**	**117,696**	**129,466**	**142,412**	**156,654**	**172,319**	**186,105**	**195,410**	**205,180**	**215,439**	**226,211**	**237,522**	**249,398**	**261,868**	**274,961**	**288,709**	**303,080**	**307,696**
Statutory Taxes	2,644	2,709	4,869	10,076	11,344	15,447	16,237	5,320	(7,576)	(11,683)	(14,019)	(16,823)	(19,347)	(22,249)	(25,586)	(29,424)	(32,366)	(35,603)	(39,163)	(43,080)	(46,526)	(48,852)	(51,295)	(53,860)	(56,553)	(59,380)	(62,350)	(65,467)	(68,740)	(72,177)	(75,779)	(76,924)
Core Result	**(6,798)**	**(6,966)**	**(13,503)**	**(30,229)**	**(34,031)**	**(46,341)**	**(48,712)**	**(15,961)**	**22,729**	**35,049**	**42,058**	**50,470**	**58,040**	**66,746**	**76,758**	**88,272**	**97,099**	**106,809**	**117,490**	**129,239**	**139,578**	**146,557**	**153,885**	**161,580**	**169,659**	**178,141**	**187,049**	**196,401**	**206,221**	**216,532**	**227,310**	**230,772**
% Change		-2.5%	-93.8%	-123.9%	-12.6%	-36.2%	-5.1%	67.2%	242.4%	54.2%	20.0%	20.0%	15.0%	15.0%	15.0%	15.0%	10.0%	10.0%	10.0%	10.0%	8.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	1.5%
NON-CORE BUSINESS																																
Other Income from Operating Activities	4,676	947	1,483	1,881	2,741	5,329	9,791	12,726	15,910	19,092	22,911	27,493	31,617	36,359	41,813	48,085	52,894	58,183	64,001	70,401	76,034	79,835	83,827	88,018	92,419	97,040	101,892	106,987	112,336	117,953	123,824	125,710
Total Provisions	(1,029)	43	(6,529)	222	(2,115)	(4,112)	(7,555)	(9,821)	(12,276)	(14,731)	(17,678)	(21,213)	(24,395)	(28,055)	(32,263)	(37,102)	(40,813)	(44,894)	(49,385)	(54,321)	(58,667)	(61,601)	(64,681)	(67,915)	(71,310)	(74,876)	(78,620)	(82,551)	(86,678)	(91,012)	(95,542)	(96,997)
Income from Cash and Cash Equivalents	480	45	165	701	142	45	83	108	134	161	194	232	267	307	353	406	447	492	541	595	643	763	884	1,012	1,168	1,337	1,537	1,748	2,006	2,285	2,615	2,945
Non-Core Result Before Taxes	**3,527**	**1,035**	**(4,881)**	**2,804**	**768**	**1,262**	**2,319**	**3,015**	**3,768**	**4,522**	**5,427**	**6,512**	**7,489**	**8,612**	**9,904**	**11,389**	**12,528**	**13,781**	**15,159**	**16,675**	**18,009**	**18,998**	**20,031**	**21,115**	**22,277**	**23,501**	**24,810**	**26,185**	**27,664**	**29,226**	**30,897**	**31,658**
Statutory Taxes	(988)	(290)	1,293	(701)	(192)	(316)	(580)	(754)	(942)	(1,131)	(1,357)	(1,628)	(1,872)	(2,153)	(2,476)	(2,847)	(3,132)	(3,445)	(3,790)	(4,169)	(4,502)	(4,749)	(5,008)	(5,279)	(5,569)	(5,875)	(6,202)	(6,546)	(6,916)	(7,307)	(7,724)	(7,914)
Non-Core Tax Adjustments	179	3,353	148	275	989	989	989	989	989	989	989	989	989	989	989	989	989	989	989	989	989	989	989	989	989	989	989	989	989	989	989	989
Actuarial Gains or (Losses) on Pension Obligations	(12)	4	43	77	(5)	(10)	(18)	(23)	(29)	(35)	(42)	(50)	(58)	(66)	(76)	(88)	(97)	(106)	(117)	(129)	(139)	(146)	(153)	(161)	(169)	(177)	(186)	(196)	(205)	(216)	(226)	(230)
Other Comprehensive Income	(12)	4	43	77	(5)	(10)	(18)	(23)	(29)	(35)	(42)	(50)	(58)	(66)	(76)	(88)	(97)	(106)	(117)	(129)	(139)	(146)	(153)	(161)	(169)	(177)	(186)	(196)	(205)	(216)	(226)	(230)
Non-Core Result	**2,706**	**4,102**	**(3,397)**	**2,455**	**1,559**	**1,926**	**2,710**	**3,227**	**3,786**	**4,345**	**5,017**	**5,822**	**6,547**	**7,381**	**8,340**	**9,443**	**10,288**	**11,218**	**12,241**	**13,366**	**14,356**	**15,091**	**15,859**	**16,664**	**17,527**	**18,437**	**19,410**	**20,432**	**21,532**	**22,693**	**23,935**	**24,502**
% Change		51.6%	-182.8%	172.3%	-36.5%	23.5%	40.7%	19.1%	17.3%	14.8%	15.4%	16.1%	12.5%	12.7%	13.0%	13.2%	9.0%	9.0%	9.1%	9.2%	7.4%	5.1%	5.1%	5.1%	5.2%	5.2%	5.3%	5.3%	5.4%	5.4%	5.5%	2.4%
FINANCIAL BUSINESS																																
Taxes and Duties	(80)	(101)	(128)	(190)	(190)	(190)	(190)	(190)	(190)	(190)	(190)	(190)	(190)	(190)	(190)	(190)	(190)	(190)	(190)	(198)	(190)	(190)	(198)	(190)	(190)	(190)	(190)	(190)	(190)	(190)	(190)	(190)
Non-Current Operating Income and Charges	(64)	(256)	31	(57)	(83)	(161)	(297)	(586)	(482)	(579)	(694)	(833)	(958)	(1,102)	(1,267)	(1,457)	(1,603)	(1,763)	(1,939)	(2,133)	(2,304)	(2,419)	(2,540)	(2,667)	(2,801)	(2,941)	(3,088)	(3,242)	(3,404)	(3,574)	(3,752)	(3,909)
Cost of Gross Financial Debt	(110)	(298)	(206)	(314)	379	0	(2,569)	(10,723)	(16,090)	(18,559)	(19,153)	(19,223)	(18,690)	(17,634)	(15,718)	(12,907)	(8,947)	(3,306)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Financial Result Before Taxes	**(263)**	**(635)**	**(303)**	**(561)**	**106**	**(351)**	**(3,056)**	**(11,299)**	**(16,763)**	**(19,327)**	**(20,038)**	**(20,246)**	**(19,838)**	**(18,925)**	**(17,175)**	**(14,554)**	**(10,740)**	**(5,259)**	**(2,129)**	**(2,323)**	**(2,494)**	**(2,609)**	**(2,738)**	**(2,857)**	**(2,991)**	**(3,131)**	**(3,278)**	**(3,432)**	**(3,594)**	**(3,764)**	**(3,942)**	**(3,999)**
Financial Tax Adjustments	74	178	80	140	(27)	88	764	2,825	4,191	4,832	5,009	5,062	4,960	4,731	4,294	3,639	2,685	1,315	532	581	624	652	683	714	748	783	819	858	899	941	986	1,000
Currency Translation Adjustments	(1,986)	(6,015)	(6,404)	(9,887)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)	(6,073)
Deferred Taxes Recognized as Equity	82	(24)	49	(149)	34	67	123	160	200	240	287	345	397	456	525	603	664	730	803	883	954	1,002	1,052	1,104	1,160	1,218	1,278	1,342	1,409	1,480	1,554	1,577
Deferred Taxes Recognized as Equity	5	(1)	(1)	(21)	1	3	5	6	8	10	11	14	16	18	21	24	27	29	32	35	38	40	42	44	46	49	51	54	56	59	62	63
Other Comprehensive Income	85	(25)	38	(170)	56	70	128	166	208	249	299	359	413	474	546	627	690	759	835	919	992	1,042	1,094	1,148	1,206	1,266	1,330	1,396	1,466	1,539	1,616	1,640
Financial Result	**(2,090)**	**(6,497)**	**(6,589)**	**(10,478)**	**(5,958)**	**(6,267)**	**(8,237)**	**(14,381)**	**(18,437)**	**(20,319)**	**(20,802)**	**(20,899)**	**(20,539)**	**(19,793)**	**(18,498)**	**(16,361)**	**(13,438)**	**(9,258)**	**(6,835)**	**(6,897)**	**(6,951)**	**(6,988)**	**(7,027)**	**(7,067)**	**(7,109)**	**(7,155)**	**(7,202)**	**(7,251)**	**(7,303)**	**(7,357)**	**(7,414)**	**(7,432)**
% Change		-210.8%	-1.4%	-59.0%	43.1%	-5.2%	-31.4%	-74.6%	-28.2%	-10.2%	-2.4%	-0.5%	1.7%	3.6%	7.0%	11.1%	17.9%	31.1%	26.2%	-0.9%	-0.8%	-0.5%	-0.6%	-0.6%	-0.6%	-0.6%	-0.7%	-0.7%	-0.7%	-0.7%	-0.8%	-0.2%
Total Comprehensive Income	**(6,182)**	**(9,361)**	**(23,489)**	**(38,252)**	**(38,429)**	**(50,683)**	**(54,239)**	**(27,116)**	**8,078**	**19,075**	**26,273**	**35,393**	**44,049**	**54,335**	**66,690**	**81,354**	**93,950**	**108,769**	**122,896**	**135,709**	**146,983**	**154,660**	**162,717**	**171,176**	**180,076**	**189,424**	**199,257**	**209,581**	**220,450**	**231,867**	**243,832**	**247,842**
% Change		-51.4%	-150.9%	-62.9%	-0.5%	-31.9%	-7.0%	50.0%	129.8%	136.1%	37.7%	34.7%	24.5%	23.4%	22.7%	22.0%	15.5%	15.8%	13.0%	10.4%	8.3%	5.2%	5.2%	5.2%	5.2%	5.2%	5.2%	5.2%	5.2%	5.2%	5.2%	1.6%

Comments

McPhy Energy's Total Comprehensive Income will become positive by 2027.

Output Balance Sheet

Output Balance Sheet

(Thousands €)	Historicals 2019	2020	2021	2022	Explicit Forecast 2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	TV 2050
Color Coding																																
Hardcoded Value: Blue																																
Calculation: Black																																
CORE BUSINESS																																
Operating Cash	650	9,884	8,858	6,773	10,970	21,330	39,191	50,948	63,685	76,422	91,706	110,047	126,554	145,537	167,368	192,473	211,721	252,893	256,182	281,800	304,344	319,561	335,539	352,316	369,932	388,429	407,850	428,243	449,655	472,137	495,639	503,187
Goodwill	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487
Concessions, Patents, Licenses	157	150	192	362	4,294	8,349	15,340	19,942	24,927	29,912	35,895	43,074	49,535	56,965	65,510	75,337	82,870	91,157	100,273	110,300	119,124	125,980	131,354	137,901	144,796	152,036	159,638	167,620	176,001	184,801	193,999	196,954
Capitalized Development Expenses	0	26	3,369	6,208	4,146	8,063	14,814	19,258	24,073	28,887	34,664	41,597	47,837	55,012	63,264	72,754	80,029	88,032	96,835	106,519	115,041	120,793	126,832	133,174	139,833	146,824	154,165	161,874	169,967	178,466	187,349	190,202
Other Intangible Non-Current Assets	157	176	3,361	6,370	8,440	16,411	30,154	39,200	49,000	58,799	70,559	84,671	97,372	111,978	128,774	148,090	162,900	179,189	197,108	216,819	234,165	245,873	258,167	271,075	284,629	298,860	313,803	329,493	345,968	363,266	381,349	387,156
Tangible Non-Current Assets	2,809	3,756	4,856	19,051	23,392	41,264	70,465	94,595	120,252	145,817	172,875	201,002	235,792	274,727	318,269	366,924	414,534	465,321	519,445	577,066	634,859	689,662	745,134	801,203	857,792	914,812	972,165	1,029,740	1,087,418	1,145,165	1,202,488	1,252,735
Inventories	1,940	2,841	4,252	12,015	12,165	19,037	26,493	23,411	17,011	20,413	24,496	29,395	33,805	38,875	44,707	51,413	56,554	62,209	68,430	75,273	81,295	85,360	89,628	94,109	98,815	103,756	108,943	114,391	120,110	126,116	132,393	134,409
Trade and Other Receivables	7,714	12,019	11,131	19,118	25,997	46,940	79,613	94,875	107,815	116,444	124,211	130,429	128,574	123,228	113,386	97,818	71,767	78,943	86,838	95,521	105,163	108,321	113,737	119,424	125,395	131,665	138,248	145,161	152,419	160,040	168,006	170,565
Trade and Other Payables	(4,881)	(6,027)	(6,682)	(18,223)	(16,600)	(25,977)	(36,152)	(31,947)	(23,213)	(27,856)	(33,427)	(40,113)	(46,130)	(53,049)	(61,006)	(70,157)	(77,173)	(84,890)	(93,379)	(102,717)	(110,935)	(116,481)	(122,305)	(128,421)	(134,842)	(141,584)	(148,663)	(156,096)	(163,901)	(172,096)	(180,662)	(183,414)
Invested Capital Core Business	**10,876**	**25,136**	**28,443**	**46,791**	**66,850**	**121,492**	**212,250**	**273,568**	**337,036**	**392,526**	**452,908**	**517,919**	**578,454**	**643,784**	**713,985**	**789,048**	**842,789**	**936,153**	**1,037,111**	**1,146,249**	**1,249,378**	**1,334,783**	**1,422,387**	**1,512,195**	**1,604,209**	**1,698,425**	**1,794,834**	**1,893,419**	**1,994,156**	**2,097,015**	**2,201,699**	**2,267,124**
% Change		131.1%	13.2%	64.5%	42.9%	81.7%	74.7%	28.9%	23.2%	16.5%	15.4%	14.4%	11.7%	11.3%	10.9%	10.5%	6.8%	11.1%	10.8%	10.5%	9.0%	6.8%	6.6%	6.3%	6.1%	5.9%	5.7%	5.5%	5.3%	5.2%	5.0%	3.0%
NON-CORE BUSINESS																																
Other	0	0	97	1,031	357	693	1,274	1,656	2,070	2,484	2,981	3,578	4,114	4,731	5,441	6,257	6,883	7,571	8,328	9,161	9,894	10,389	10,908	11,454	12,026	12,627	13,259	13,922	14,618	15,349	16,113	16,358
Other Intangible Non-Current Assets	0	0	97	1,031	357	693	1,274	1,656	2,070	2,484	2,981	3,578	4,114	4,731	5,441	6,257	6,883	7,571	8,328	9,161	9,894	10,389	10,908	11,454	12,026	12,627	13,259	13,922	14,618	15,349	16,113	16,358
Provisions > 1 Year	(756)	(1,218)	(2,195)	(2,482)	(2,791)	(6,028)	(11,985)	(14,934)	(18,085)	(22,268)	(26,923)	(31,970)	(36,683)	(42,400)	(48,758)	(55,963)	(61,572)	(67,785)	(74,546)	(81,977)	(88,547)	(92,984)	(97,426)	(102,504)	(107,633)	(113,016)	(118,665)	(124,598)	(130,828)	(137,370)	(144,207)	(146,403)
Provisions < 1 Year	(584)	(499)	(6,364)	(5,651)	(5,469)	(12,710)	(28,430)	(32,740)	(39,206)	(49,283)	(60,263)	(76,437)	(80,922)	(93,927)	(108,036)	(123,682)	(136,184)	(150,024)	(164,940)	(181,329)	(195,902)	(205,734)	(215,989)	(226,774)	(238,131)	(250,040)	(262,534)	(275,660)	(289,447)	(303,919)	(319,045)	(323,904)
Other Current Liabilities	(2,990)	(7,160)	(11,546)	(38,230)	(12,985)	(25,249)	(46,392)	(60,310)	(75,388)	(90,465)	(108,558)	(130,270)	(149,810)	(172,282)	(198,124)	(227,843)	(250,627)	(275,689)	(303,258)	(333,584)	(360,271)	(378,285)	(397,199)	(417,059)	(437,912)	(459,807)	(482,798)	(506,937)	(532,284)	(558,899)	(586,719)	(595,653)
Invested Capital Non-Core Business	**(4,330)**	**(8,877)**	**(20,148)**	**(45,332)**	**(20,889)**	**(43,294)**	**(85,533)**	**(106,327)**	**(130,609)**	**(159,532)**	**(192,763)**	**(229,100)**	**(263,302)**	**(303,877)**	**(349,477)**	**(401,230)**	**(441,500)**	**(485,927)**	**(534,425)**	**(587,729)**	**(634,825)**	**(666,613)**	**(699,906)**	**(734,883)**	**(771,649)**	**(810,235)**	**(850,737)**	**(893,273)**	**(937,942)**	**(984,838)**	**(1,033,858)**	**(1,049,603)**
% Change		-105.0%	-127.0%	-125.0%	53.9%	-107.3%	-97.6%	-24.3%	-22.8%	-22.1%	-20.8%	-18.9%	-14.9%	-15.4%	-15.0%	-14.8%	-10.0%	-10.1%	-10.0%	-10.0%	-8.0%	-5.0%	-5.0%	-5.0%	-5.0%	-5.0%	-5.0%	-5.0%	-5.0%	-5.0%	-5.0%	-1.5%
FINANCIAL BUSINESS																																
Excess of Cash	12,345	187,790	168,297	128,690	50,540	0	0	0	0	0	0	0	0	0	0	0	0	7,288	65,434	131,738	207,991	293,568	369,430	451,541	540,353	636,262	739,761	851,377	971,668	1,101,200	1,240,600	1,389,193
Non-Current Financial Assets	316	340	420	12,857	0	3,153	13,159	19,746	22,775	23,504	23,590	22,936	21,640	19,288	15,859	10,979	4,057	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Deferred Tax Assets	76	87	126	66	0	834	3,482	5,225	6,027	6,220	6,242	6,069	5,726	5,104	4,191	2,905	1,074	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Current Tax Assets	746	748	696	1,101	0	6,556	27,361	41,055	47,353	48,870	49,048	47,688	44,993	40,104	32,933	22,828	8,456	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Investment Subsidies	0	0	0	(2,500)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Borrowings and Financial Debt Maturity > 1 Year	(1,784)	(2,463)	(3,518)	(4,505)	0	(21,770)	(90,861)	(136,339)	(157,254)	(162,292)	(162,883)	(158,365)	(149,415)	(133,180)	(109,365)	(75,809)	(28,015)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Deferred Tax Liabilities	(577)	(609)	(640)	(688)	0	(5,394)	(22,514)	(33,783)	(38,965)	(40,214)	(40,360)	(39,241)	(37,023)	(33,000)	(27,099)	(18,784)	(6,942)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Borrowings and Financial Debt Maturing < 1 Year	(1,088)	(4,918)	(1,065)	(1,531)	0	(15,758)	(65,765)	(98,682)	(113,621)	(117,467)	(117,895)	(114,625)	(108,147)	(96,396)	(79,158)	(54,870)	(20,277)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Debt	**(2,311)**	**(6,815)**	**(3,981)**	**4,780**	**0**	**(32,379)**	**(135,138)**	**(202,778)**	**(233,885)**	**(241,378)**	**(242,257)**	**(235,537)**	**(222,226)**	**(198,080)**	**(162,659)**	**(112,751)**	**(41,667)**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Net Financial Assets	**10,034**	**180,975**	**164,316**	**133,470**	**50,540**	**(32,379)**	**(135,138)**	**(202,778)**	**(233,885)**	**(241,378)**	**(242,257)**	**(235,537)**	**(222,226)**	**(198,080)**	**(162,659)**	**(112,751)**	**(41,667)**	**7,288**	**65,434**	**131,738**	**207,991**	**293,568**	**369,430**	**451,541**	**540,353**	**636,262**	**739,761**	**851,377**	**971,668**	**1,101,200**	**1,240,600**	**1,389,193**
% Change		1703.6%	-9.2%	-18.8%	-62.1%	-164.1%	-317.4%	-50.1%	-15.3%	-3.2%	-0.4%	2.8%	5.7%	10.9%	17.9%	30.7%	63.0%	-117.5%	797.8%	101.3%	57.9%	41.1%	25.8%	22.2%	19.7%	17.7%	16.3%	15.1%	14.1%	13.3%	12.7%	12.0%
Total Equity	**16,582**	**197,236**	**172,611**	**134,930**	**96,501**	**45,818**	**(8,421)**	**(35,536)**	**(27,458)**	**(8,384)**	**17,889**	**53,282**	**92,926**	**141,827**	**201,848**	**275,067**	**359,622**	**457,514**	**568,121**	**690,258**	**822,544**	**961,738**	**1,091,911**	**1,228,852**	**1,372,913**	**1,524,452**	**1,683,857**	**1,851,523**	**2,027,882**	**2,213,376**	**2,408,441**	**2,606,715**
% Change		1089.5%	-12.5%	-21.8%	-28.5%	-52.5%	-118.4%	-322.0%	22.7%	69.5%	-313.4%	197.9%	74.4%	52.6%	42.3%	36.3%	30.7%	27.2%	24.2%	21.5%	19.2%	16.9%	13.5%	12.5%	11.7%	11.0%	10.5%	10.0%	9.5%	9.1%	8.8%	8.2%
Transactions with Shareholders		0	0	0	0	0	0	0	0	0	0	0	0	(4,405)	(5,433)	(6,669)	(8,135)	(9,395)	(10,877)	(12,290)	(13,571)	(14,698)	(15,466)	(32,543)	(54,235)	(56,015)	(57,885)	(59,851)	(41,916)	(44,090)	(46,373)	(48,766)	(49,568)
Payout Ratio		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
CHECK	**16,580**	**197,234**	**172,611**	**134,929**	**96,501**	**45,818**	**(8,421)**	**(35,536)**	**(27,458)**	**(8,384)**	**17,889**	**53,282**	**92,926**	**141,827**	**201,848**	**275,067**	**359,622**	**457,514**	**568,121**	**690,258**	**822,544**	**961,738**	**1,091,911**	**1,228,852**	**1,372,913**	**1,524,452**	**1,683,857**	**1,851,523**	**2,027,882**	**2,213,376**	**2,408,441**	**2,606,715**

Comments

The average payout ratio in the green and renewable energy sector is equal to 56.85% (Source: Damodaran). However, McPhy Energy is still in its early stages of development and the Company explicitly states that it does not plan any dividend distribution to shareholders in the short term. To encapsulate both these concepts, it was assumed that a dividend distribution will start in 2031 with a payout ratio of 10%, which will then increase to 20% by 2041.

Output Cash Flows

Output Cash Flows

(Thousands €)	Historicals 2019	2020	2021	2022	Explicit Forecast 2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	TV 2050
Color Coding																																
Hardcoded Value: Blue																																
Calculation: Black																																
Core Result	(6,798)	(6,966)	(13,503)	(30,229)	(34,031)	(46,341)	(48,712)	(15,961)	22,729	35,049	42,058	50,470	58,040	66,746	76,758	88,272	97,099	106,809	117,490	129,239	139,578	146,557	153,885	161,580	169,659	178,141	187,049	196,401	206,221	216,532	227,310	230,772
Change in Core Invested Capital		14,260	3,307	18,348	20,059	54,641	90,759	61,318	63,467	55,490	60,382	65,011	60,535	65,330	70,201	75,063	53,741	93,364	100,958	109,138	103,129	85,405	87,603	89,808	92,014	94,216	96,409	98,585	100,737	102,859	104,684	65,425
Core FCF	**(21,226)**	**(16,810)**	**(48,577)**	**(54,090)**	**(100,983)**	**(139,470)**	**(77,279)**	**(40,738)**	**(20,442)**	**(18,324)**	**(14,541)**	**(2,495)**	**1,417**	**6,558**	**13,209**	**43,359**	**13,445**	**16,532**	**20,101**	**36,450**	**61,152**	**66,282**	**71,772**	**77,644**	**83,925**	**90,640**	**97,816**	**105,484**	**113,673**	**122,626**	**165,347**
Non-Core Result	2,706	4,102	(3,397)	2,455	1,559	1,926	2,710	3,227	3,786	4,345	5,017	5,822	6,547	7,381	8,340	9,443	10,288	11,218	12,241	13,366	14,356	15,091	15,859	16,664	17,527	18,437	19,410	20,432	21,532	22,693	23,935	24,502
Change in Non-Core Invested Capital		(4,547)	(11,271)	(25,184)	24,443	(22,405)	(42,239)	(20,794)	(24,282)	(28,923)	(33,231)	(36,357)	(34,202)	(40,575)	(45,600)	(51,753)	(40,270)	(44,427)	(48,498)	(53,304)	(47,096)	(51,788)	(33,292)	(34,977)	(36,766)	(38,586)	(40,502)	(42,536)	(44,669)	(46,896)	(49,020)	(15,745)
Non-Core FCF	**8,649**	**7,874**	**27,639**	**(22,884)**	**24,331**	**44,949**	**24,020**	**28,068**	**33,268**	**38,248**	**42,159**	**40,749**	**47,956**	**53,940**	**61,196**	**50,558**	**55,645**	**60,739**	**66,671**	**61,452**	**46,879**	**49,151**	**51,642**	**54,293**	**57,023**	**59,912**	**62,968**	**66,200**	**69,589**	**72,955**	**40,247**	
Financial Result	(2,090)	(6,497)	(6,589)	(10,478)	(5,958)	(6,267)	(8,237)	(14,381)	(18,437)	(20,319)	(20,802)	(20,899)	(20,539)	(19,793)	(18,408)	(16,361)	(13,458)	(9,258)	(6,835)	(6,897)	(6,951)	(6,988)	(7,027)	(7,067)	(7,110)	(7,155)	(7,202)	(7,251)	(7,303)	(7,357)	(7,414)	(7,432)
Change in Net Financial Assets		170,941	(16,659)	(30,846)	(82,930)	(82,919)	(102,758)	(67,640)	(31,108)	(7,493)	(878)	6,719	13,311	24,147	35,420	49,908	71,084	48,955	58,146	66,304	76,252	85,577	75,862	82,110	88,813	95,909	103,498	111,617	120,291	129,532	139,401	148,593
Debt CF	**164,444**	**(23,248)**	**(41,324)**	**(88,888)**	**(89,186)**	**(110,995)**	**(82,021)**	**(49,545)**	**(27,812)**	**(21,681)**	**(14,179)**	**(7,228)**	**4,354**	**17,012**	**33,547**	**57,647**	**39,697**	**51,311**	**59,407**	**69,301**	**78,589**	**68,836**	**75,043**	**81,703**	**88,754**	**96,297**	**104,366**	**112,980**	**122,174**	**131,987**	**141,161**	
Total Comprehensive Income	(6,182)	(9,361)	(23,489)	(38,252)	(38,429)	(50,683)	(54,239)	(27,116)	8,078	19,075	26,273	35,393	44,049	54,335	66,090	81,354	93,950	108,769	122,896	135,709	146,983	154,660	162,717	171,176	180,076	189,424	199,257	209,581	220,450	231,867	243,832	247,842
Change in Equity		180,654	(24,625)	(37,681)	(38,429)	(50,683)	(54,239)	(27,116)	8,078	19,075	26,273	35,393	39,644	48,901	60,021	73,218	84,555	97,892	110,607	122,138	132,285	139,194	130,174	136,941	144,061	151,539	159,405	167,665	176,360	185,494	195,065	198,273
Equity CF	**(190,015)**	**1,136**	**(571)**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4,405**	**5,433**	**6,069**	**8,135**	**9,395**	**10,877**	**12,290**	**13,571**	**14,698**	**15,466**	**32,543**	**34,235**	**36,015**	**37,885**	**39,851**	**41,916**	**44,090**	**46,373**	**48,766**	**49,568**
Financing CF	**(25,571)**	**(22,111)**	**(41,895)**	**(88,888)**	**(89,186)**	**(110,995)**	**(82,021)**	**(49,545)**	**(27,812)**	**(21,681)**	**(14,179)**	**(2,823)**	**9,788**	**23,681**	**41,682**	**67,042**	**50,573**	**63,601**	**72,978**	**83,999**	**94,055**	**101,379**	**109,278**	**117,718**	**126,639**	**136,148**	**146,282**	**157,078**	**168,548**	**180,753**	**190,729**	
Total FCF	**(12,577)**	**(8,936)**	**(20,938)**	**(76,974)**	**(76,652)**	**(94,521)**	**(53,259)**	**(12,671)**	**12,827**	**19,924**	**27,618**	**38,255**	**49,373**	**60,498**	**74,405**	**93,917**	**69,090**	**77,271**	**86,772**	**97,902**	**108,031**	**115,433**	**123,413**	**131,938**	**140,948**	**150,551**	**160,784**	**171,684**	**183,262**	**195,581**	**205,594**	
% Change		28.9%	-134.3%	-267.6%	0.4%	-23.3%	43.7%	76.2%	201.2%	55.3%	38.6%	38.5%	29.1%	22.5%	23.0%	26.2%	-26.4%	11.8%	12.3%	12.8%	10.3%	6.9%	6.9%	6.9%	6.8%	6.8%	6.8%	6.8%	6.7%	6.7%	5.1%	

Comments

McPhy's Free Cash Flows will become positive in 2028.

Value

Value

(Thousands €)	Historical 2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	TV 2050
Color Coding																													
Hardcoded Value: Blue																													
Calculation: Black																													
Total FCF		(76,974)	(76,652)	(94,521)	(53,259)	(12,671)	12,827	19,924	27,618	38,255	49,373	60,498	74,405	93,917	69,090	77,271	86,772	97,902	108,031	115,433	123,413	131,938	140,948	150,551	160,784	171,684	183,262	195,581	205,594
WACC	10.71%																												
Perpetual Growth Rate	1.50%																												
Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	
Discount Factor		90.3%	81.6%	73.7%	66.6%	60.1%	54.3%	49.1%	44.3%	40.0%	36.2%	32.7%	29.5%	26.7%	24.1%	21.7%	19.6%	17.7%	16.0%	14.5%	13.1%	11.8%	10.7%	9.6%	8.7%	7.9%	7.1%	6.4%	
Present Value (PV) of FCF		(69,530)	(62,544)	(69,666)	(35,458)	(7,620)	6,968	9,777	12,242	15,317	17,856	19,764	21,957	25,035	16,636	16,806	17,048	17,375	17,318	16,715	16,143	15,589	15,043	14,514	14,002	13,505	13,022	12,553	
Terminal Value																												2,233,366	
Sum of PV of FCF	100,365																												
PV of Terminal Value	143,346																												
Enterprise Value	**243,711**																												
PV of Financial Business (Book Value)	133,470																												
Equity Value	**377,181**																												
Shares Outstanding	27,958,035																												
Fair Share Price	**13.49**																												
Current Share Price	8.43																												
Implied Premium	**60.0%**																												
Market Capitalization	235,686																												
Implied Premium	**60.0%**																												

Sensitivity Analysis for Fair Share Price

WACC \ Perpetual Growth Rate	1.1%	1.3%	1.5%	1.7%	1.9%
10.3%	14.70	14.83	14.96	15.10	15.24
10.5%	13.97	**14.08**	**14.20**	**14.33**	14.46
10.7%	13.28	**13.38**	**13.49**	**13.60**	13.72
10.9%	12.63	**12.72**	**12.82**	**12.92**	13.03
11.1%	12.01	12.10	12.19	12.28	12.38

Sensitivity Analysis for Equity Value

WACC \ Perpetual Growth Rate	1.1%	1.3%	1.5%	1.7%	1.9%
10.3%	411,039	414,549	418,219	422,059	426,082
10.5%	390,538	**393,739**	**397,082**	**400,576**	404,233
10.7%	371,212	**374,133**	**377,181**	**380,364**	383,692
10.9%	352,977	**355,646**	**358,428**	**361,331**	364,363
11.1%	335,739	338,199	340,741	343,392	346,157

Comments

Since the fair share price derived from the DCF valuation (€13.49) is higher than the current share price (€8.43), the stock is potentially undervalued. This means that the intrinsic value of the company is higher than what the market is currently reflecting in its share price. At the same time, this means that there is potential for the stock price to increase in the future, thereby representing an interesting investment opportunity for investors.
It is worth mentioning that valuation is a long-term tool, which is ideal to drive long-term investment decisions. Investors who are willing to hold the stock for an extended period of time might benefit from the Company's fundamentals and growth prospects in the long run.

Sensitivity analyses are commented in a following sheet.

Ratios

Ratios

(Thousands €)	Historical 2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	TV 2050
Color Coding																																
Hardcoded Value: Blue																																
Calculation: Black																																
Cash Flow Management																																
Inventories	1,940	2,841	4,252	12,015	12,165	19,057	26,493	23,411	17,011	20,413	24,496	29,395	33,805	38,875	44,707	51,413	56,554	62,209	68,430	75,273	81,295	85,360	89,628	94,109	98,815	103,756	108,943	114,391	120,110	126,116	132,393	134,409
COGS	(6,142)	(7,358)	(10,527)	(15,990)	(19,561)	(30,610)	(42,599)	(37,644)	(27,353)	(32,823)	(39,388)	(47,266)	(54,356)	(62,509)	(71,885)	(82,668)	(90,955)	(100,028)	(110,051)	(121,034)	(130,717)	(137,253)	(144,116)	(151,321)	(158,887)	(166,832)	(175,173)	(183,932)	(193,129)	(202,785)	(212,879)	(216,121)
Average Holding Period	**115**	**141**	**147**	**276**	**227**	**227**	**227**	**227**	**227**	**227**	**227**	**227**	**227**	**227**	**227**	**227**	**227**	**227**	**227**	**227**	**227**	**227**	**227**	**227**	**227**	**227**	**227**	**227**	**227**	**227**	**227**	**227**
Trade and Other Receivables	7,714	12,019	11,151	19,118	25,997	46,940	79,613	94,875	107,815	116,444	124,211	130,429	128,574	123,226	113,586	97,818	71,767	78,943	86,838	95,521	105,163	108,321	113,757	119,424	125,395	131,665	138,248	145,161	152,419	160,040	168,006	170,565
Net Revenues	11,587	13,694	13,150	16,061	23,400	45,500	83,600	108,680	135,850	163,020	195,624	234,749	269,961	310,455	357,024	410,577	451,655	496,798	546,478	601,126	649,216	681,677	715,761	751,549	789,126	828,582	870,012	913,512	959,188	1,007,147	1,057,279	1,073,580
Average Collection Period	**247**	**320**	**309**	**434**	**406**	**377**	**348**	**319**	**290**	**261**	**232**	**203**	**174**	**145**	**116**	**87**	**58**	**58**	**58**	**58**	**58**	**58**	**58**	**58**	**58**	**58**	**58**	**58**	**58**	**58**	**58**	**58**
Trade and Other Payables	(6,881)	(6,027)	(6,682)	(18,223)	(16,680)	(25,977)	(36,152)	(31,947)	(23,213)	(27,856)	(33,427)	(40,113)	(46,130)	(53,049)	(61,006)	(70,157)	(77,173)	(84,890)	(93,579)	(102,717)	(110,955)	(116,481)	(122,305)	(128,421)	(134,842)	(141,584)	(148,663)	(156,096)	(163,901)	(172,096)	(180,662)	(183,414)
COGS	(6,142)	(7,358)	(10,527)	(15,990)	(19,561)	(30,610)	(42,599)	(37,644)	(27,353)	(32,823)	(39,388)	(47,266)	(54,356)	(62,509)	(71,885)	(82,668)	(90,955)	(100,028)	(110,051)	(121,034)	(130,717)	(137,253)	(144,116)	(151,321)	(158,887)	(166,832)	(175,173)	(183,932)	(193,129)	(202,785)	(212,879)	(216,121)
Average Payable Period	**290**	**299**	**232**	**418**	**330**	**330**	**310**	**310**	**310**	**310**	**310**	**310**	**310**	**310**	**310**	**310**	**310**	**310**	**310**	**310**	**310**	**310**	**310**	**310**	**310**	**310**	**310**	**310**	**310**	**310**	**310**	**310**
Capital Structure																																
Net Financial Assets	10,034	180,975	164,516	133,470	50,540	(32,379)	(135,138)	(202,778)	(233,885)	(241,578)	(242,257)	(255,537)	(222,226)	(198,080)	(162,659)	(112,751)	(41,667)	7,288	65,434	131,738	207,991	295,568	369,430	451,541	540,553	636,262	739,761	851,377	971,668	1,101,200	1,240,600	1,389,193
Total Equity	16,582	197,236	172,611	134,930	96,501	45,818	(8,421)	(55,536)	(27,458)	(8,384)	17,889	53,282	92,926	141,827	201,848	275,067	359,622	457,514	568,121	690,258	822,544	961,758	1,091,911	1,228,852	1,372,913	1,524,452	1,683,857	1,851,523	2,027,882	2,213,576	2,408,441	2,606,715
Gearing Ratio	**37.7%**	**47.9%**	**48.8%**	**49.7%**	**34.4%**	**-240.9%**	**94.1%**	**85.1%**	**89.5%**	**96.6%**	**108.0%**	**129.2%**	**171.9%**	**352.1%**	**-415.1%**	**-69.5%**	**-13.1%**	**1.6%**	**10.3%**	**16.0%**	**20.2%**	**23.4%**	**25.3%**	**26.9%**	**28.2%**	**29.4%**	**30.5%**	**31.5%**	**32.4%**	**33.2%**	**34.0%**	**34.8%**
Net Financial Assets	10,034	180,975	164,516	133,470	50,540	(32,379)	(135,138)	(202,778)	(233,885)	(241,578)	(242,257)	(255,537)	(222,226)	(198,080)	(162,659)	(112,751)	(41,667)	7,288	65,434	131,738	207,991	295,568	369,430	451,541	540,553	636,262	739,761	851,377	971,668	1,101,200	1,240,600	1,389,193
Total Equity	16,582	197,236	172,611	134,930	96,501	45,818	(8,421)	(55,536)	(27,458)	(8,384)	17,889	53,282	92,926	141,827	201,848	275,067	359,622	457,514	568,121	690,258	822,544	961,758	1,091,911	1,228,852	1,372,913	1,524,452	1,683,857	1,851,523	2,027,882	2,213,576	2,408,441	2,606,715
D/E Ratio	**60.5%**	**91.8%**	**95.2%**	**98.9%**	**52.4%**	**-70.7%**	**1604.8%**	**570.6%**	**851.8%**	**2879.1%**	**-1354.2%**	**-442.1%**	**-239.3%**	**-199.7%**	**-86.6%**	**-41.0%**	**-11.6%**	**1.6%**	**11.5%**	**19.1%**	**25.3%**	**30.5%**	**33.8%**	**36.7%**	**39.4%**	**41.7%**	**43.9%**	**46.0%**	**47.9%**	**49.8%**	**51.5%**	**53.3%**
Profitability																																
Net Revenues	11,587	13,694	13,150	16,061	23,400	45,500	83,600	108,680	135,850	163,020	195,624	234,749	269,961	310,455	357,024	410,577	451,655	496,798	546,478	601,126	649,216	681,677	715,761	751,549	789,126	828,582	870,012	913,512	959,188	1,007,147	1,057,279	1,073,580
COGS	(6,142)	(7,358)	(10,527)	(15,990)	(19,561)	(30,610)	(42,599)	(37,644)	(27,353)	(32,823)	(39,388)	(47,266)	(54,356)	(62,509)	(71,885)	(82,668)	(90,955)	(100,028)	(110,051)	(121,034)	(130,717)	(137,253)	(144,116)	(151,321)	(158,887)	(166,832)	(175,173)	(183,932)	(193,129)	(202,785)	(212,879)	(216,121)
Gross Profit	5,245	6,336	2,603	161	3,839	14,890	41,001	71,036	108,497	130,197	156,236	187,483	215,606	247,946	285,138	327,909	360,700	396,770	436,447	480,092	518,499	544,424	571,645	600,227	630,239	661,751	694,838	729,580	766,059	804,362	844,401	857,459
Gross Profit Margin	**46.1%**	**46.3%**	**19.8%**	**1.0%**	**16.4%**	**32.7%**	**49.0%**	**65.4%**	**79.9%**	**79.9%**	**79.9%**	**79.9%**	**79.9%**	**79.9%**	**79.9%**	**79.9%**	**79.9%**	**79.9%**	**79.9%**	**79.9%**	**79.9%**	**79.9%**	**79.9%**	**79.9%**	**79.9%**	**79.9%**	**79.9%**	**79.9%**	**79.9%**	**79.9%**	**79.9%**	**79.9%**
Core Result Before Taxes	(9,442)	(9,675)	(18,372)	(40,505)	(45,574)	(61,789)	(64,949)	(21,281)	30,306	46,751	56,078	67,295	77,387	88,995	102,545	117,696	129,466	142,412	156,654	172,519	186,105	195,410	205,180	215,459	226,211	237,522	249,398	261,868	274,961	288,709	303,080	307,696
Net Revenues	11,587	13,694	13,150	16,061	23,400	45,500	83,600	108,680	135,850	163,020	195,624	234,749	269,961	310,455	357,024	410,577	451,655	496,798	546,478	601,126	649,216	681,677	715,761	751,549	789,126	828,582	870,012	913,512	959,188	1,007,147	1,057,279	1,073,580
EBIT Margin	**-82.9%**	**-70.7%**	**-139.9%**	**-250.9%**	**-193.9%**	**-133.8%**	**-77.7%**	**-19.6%**	**22.3%**	**28.7%**	**28.7%**	**28.7%**	**28.7%**	**28.7%**	**28.7%**	**28.7%**	**28.7%**	**28.7%**	**28.7%**	**28.7%**	**28.7%**	**28.7%**	**28.7%**	**28.7%**	**28.7%**	**28.7%**	**28.7%**	**28.7%**	**28.7%**	**28.7%**	**28.7%**	**28.7%**
Net Revenues	11,587	13,694	13,150	16,061	23,400	45,500	83,600	108,680	135,850	163,020	195,624	234,749	269,961	310,455	357,024	410,577	451,655	496,798	546,478	601,126	649,216	681,677	715,761	751,549	789,126	828,582	870,012	913,512	959,188	1,007,147	1,057,279	1,073,580
Invested Capital Core Business	10,876	25,136	28,443	46,791	66,850	121,492	212,250	273,568	337,036	392,526	452,908	517,919	578,454	643,784	713,985	780,048	842,789	936,153	1,037,111	1,146,249	1,249,378	1,334,783	1,422,587	1,512,195	1,604,209	1,698,425	1,794,834	1,893,419	1,994,356	2,097,015	2,201,699	2,267,124
Invested Capital Non-Core Business	(4,330)	(8,877)	(20,148)	(45,532)	(20,889)	(83,294)	(83,535)	(106,527)	(136,609)	(159,532)	(192,763)	(229,100)	(263,502)	(303,877)	(349,477)	(401,230)	(441,560)	(485,527)	(534,425)	(587,729)	(634,823)	(666,613)	(699,906)	(734,883)	(771,649)	(810,235)	(850,737)	(893,273)	(937,942)	(984,838)	(1,033,858)	(1,049,603)
Invested Capital	6,546	16,259	8,295	1,459	45,961	38,198	126,717	167,241	200,427	232,994	260,145	288,819	315,152	339,907	364,508	387,818	401,289	450,226	502,686	558,520	614,555	668,170	722,681	777,312	832,560	888,190	944,097	1,000,145	1,056,214	1,112,177	1,167,841	1,217,522
Asset Turnover (1)	**174.0%**	**84.2%**	**158.3%**	**1100.7%**	**50.9%**	**58.2%**	**66.0%**	**65.0%**	**65.8%**	**70.0%**	**75.2%**	**81.3%**	**85.7%**	**91.3%**	**97.9%**	**105.9%**	**112.5%**	**110.3%**	**108.7%**	**107.6%**	**105.6%**	**102.0%**	**99.1%**	**96.7%**	**94.8%**	**93.3%**	**92.2%**	**91.3%**	**90.8%**	**90.6%**	**90.5%**	**88.2%**
ROIC and ROE																																
Core Result		(6,066)	(13,503)	(50,229)	(54,031)	(46,341)	(48,712)	(15,961)	22,729	35,049	42,058	50,470	58,040	66,746	76,758	88,272	97,099	106,809	117,490	129,259	139,578	146,557	153,885	161,580	169,659	178,141	187,049	196,401	206,221	216,532	227,310	230,772
Non-Core Result		4,102	(3,397)	2,455	1,559	1,926	2,710	5,227	7,786	4,345	5,017	5,822	6,547	7,581	8,540	9,445	10,288	11,218	12,241	13,366	14,356	15,091	15,859	16,664	17,527	18,457	19,410	20,452	21,532	22,695	23,955	24,502
Operating Result		(2,864)	(16,900)	(27,774)	(52,471)	(44,416)	(46,002)	(12,734)	20,515	39,394	47,075	56,292	64,588	74,128	85,098	97,715	107,388	118,027	129,731	142,606	153,955	161,648	169,744	178,244	187,186	196,578	206,458	216,852	227,753	239,225	251,266	255,274
Invested Capital (t-1)		6,546	16,259	8,295	1,459	45,961	38,198	126,717	167,241	206,427	232,994	260,145	288,819	315,152	339,907	364,508	387,818	401,289	450,226	502,686	558,520	614,555	668,170	722,681	777,312	832,560	888,190	944,097	1,000,145	1,056,214	1,112,177	1,167,841
Total ROIC		**-43.8%**	**-103.9%**	**-334.8%**	**-2225.4%**	**-96.6%**	**-58.8%**	**-10.0%**	**15.9%**	**19.1%**	**20.2%**	**21.6%**	**22.4%**	**23.5%**	**25.0%**	**26.8%**	**27.7%**	**29.4%**	**28.8%**	**28.4%**	**27.6%**	**26.3%**	**25.4%**	**24.7%**	**24.1%**	**23.6%**	**23.2%**	**23.0%**	**22.8%**	**22.6%**	**22.6%**	**21.9%**
Total Comprehensive Income	(6,182)	(9,361)	(23,489)	(58,252)	(58,429)	(50,683)	(54,239)	(27,116)	8,078	19,075	26,273	35,393	44,049	54,535	66,690	81,354	93,950	108,769	122,896	135,709	146,983	154,660	162,717	171,176	180,076	189,424	199,257	209,581	220,450	231,867	243,852	247,842
Total Equity	16,582	197,236	172,611	134,930	96,501	45,818	(8,421)	(55,536)	(27,458)	(8,384)	17,889	53,282	92,926	141,827	201,848	275,067	359,622	457,514	568,121	690,258	822,544	961,758	1,091,911	1,228,852	1,372,913	1,524,452	1,683,857	1,851,523	2,027,882	2,213,576	2,408,441	2,606,715
ROIC	**-37.3%**	**-4.7%**	**-13.6%**	**-28.3%**	**-39.8%**	**-110.6%**	**644.1%**	**76.3%**	**-29.4%**	**-227.5%**	**146.9%**	**66.4%**	**47.4%**	**38.3%**	**33.0%**	**29.6%**	**26.3%**	**23.8%**	**21.6%**	**19.7%**	**17.9%**	**16.1%**	**14.9%**	**13.9%**	**13.1%**	**12.4%**	**11.8%**	**11.3%**	**10.9%**	**10.5%**	**10.1%**	**9.5%**

Comments

The average holding period, the average collection period and the average payable period had been forecasted in the previous sheets. This is just a check to verify their accuracy.

Profitability ratios (Gross Profit Margin and EBIT Margin) follow an interesting path. They start from negative or low values and they improve in the next years, before stabilizing in 2027/2028. This is in line with the expected increase in profitability of McPhy.

McPhy's ROIC will become positive in 2027, while the ROE will become permanently positive in 2029.

Monte Carlo Simulation

Monte Carlo Simulation

	Historical	Explicit Forecast																												TV
(Thousands €)	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Color Coding																													
Hardcoded Value: Blue																													
Calculation: Black																													
Assumption																													
Forecast																													
Total FCF		**(76,974)**	**(76,652)**	**(94,521)**	**(53,259)**	**(12,671)**	**12,827**	**19,924**	**27,618**	**38,255**	**49,373**	**60,498**	**74,405**	**93,917**	**69,090**	**77,271**	**86,772**	**97,902**	**108,031**	**115,433**	**123,413**	**131,938**	**140,948**	**150,551**	**160,784**	**171,684**	**183,262**	**195,581**	**205,594**
WACC																													
Perpetual Growth Rate																													
Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	
Discount Factor		90.3%	81.6%	73.7%	66.6%	60.1%	54.3%	49.1%	44.3%	40.0%	36.2%	32.7%	29.5%	26.7%	24.1%	21.7%	19.6%	17.7%	16.0%	14.5%	13.1%	11.8%	10.7%	9.6%	8.7%	7.9%	7.1%	6.4%	
Present Value (PV) of FCF		(69,530)	(62,544)	(69,666)	(35,458)	(7,620)	6,968	9,777	12,242	15,317	17,856	19,764	21,957	25,035	16,636	16,806	17,048	17,375	17,318	16,715	16,143	15,589	15,043	14,514	14,002	13,505	13,022	12,553	
Terminal Value																												2,233,366	
Sum of PV of FCF	100,365																												
PV of Terminal Value	143,346																												
Enterprise Value	**243,711**																												
PV of Financial Business (Book Value)	133,470																												
Equity Value	**377,181**																												
Shares Outstanding	27,958,033																												
Fair Share Price	13.49																												

Forecasts

Worksheet: [DCF McPhy Energy SA.xlsx]Inputs

Forecast: Fair Share Price **Cell: C36**

End of Forecasts

Assumptions

Worksheet: [DCF McPhy Energy SA.xlsx]Inputs

Assumption: Perpetual Growth Rate **Cell: C20**
Assumption: WACC **Cell: C19**

End of Assumptions

Crystal Ball Report - Full
Simulation started on 6/29/2023 at 9:49 PM
Simulation stopped on 6/29/2023 at 10:46 PM

Run preferences:

Number of trials run	100,000
Monte Carlo	
Random seed	
Precision control on	
Confidence level	95.00%

Run statistics:

Total running time (sec)	3421.95
Trials/second (average)	29
Random numbers per sec	58

Crystal Ball data:

Assumptions	2
Correlations	0
Correlation matrices	0
Decision variables	0
Forecasts	1

A Monte Carlo simulation was performed to analyze the potential outcomes of our system by incorporating uncertainty and randomness. More specifically, it uses repeated iterations to generate a range of potential outcomes (in our case, potential fair share prices). Analysts often use it together with the sensitivity analysis to draw better investment decisions.

The tool through which the simulation was conducted is the Oracle Crystal Ball package.
The main source for this analysis was Chapter 6 of the book "Strategic Risk Taking: Framework for Risk Management" by Damodaran (2007).

The first step consisted in setting the assumptions of the model. First, a normal distribution was assumed for WACC with a mean of 10.71% and a standard deviation of 1.07%. A normal distribution is often considered suitable to model WACC due to the Central Limit Theorem (CLT). According to the CLT, the sum of a large number of independent and identically distributed random variables, such as the sources contributing to WACC, tends to follow a normal distribution. Second, a normal distribution was assumed also for the perpetual growth rate with a mean of 1.5% and a standard deviation of 0.15%. In this case, the choice stemmed from the fact that market expectations, industry trends and macroeconomic factors, which influence the perpetual growth rate, are often modeled assuming a normal distribution. A lognormal distribution was not considered appropriate to represent WACC nor the perpetual growth rate. For the perpetual growth rate, the use of a lognormal distribution would have implied that it could have taken a wide range of values with varying probabilities, which is not consistent with the concept of stable growth rate. Similarly, WACC is often considered more as a deterministic value rather than a random variable. From here, the inappropriateness of the lognormal distribution.

Assumptions and related distributions can be visualized below.

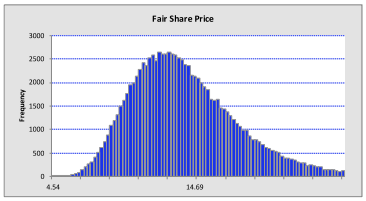
The simulation resulted in a mean of 14.10 and a median of 13.48, with a standard deviation of 4.04. Both the mean and the median are in line with the fair share price forecasted in the DCF analysis (13.49). A skewness of 1.07 indicates a positive skewness, meaning that the distribution is skewed to the right side of the chart (right tail). This means that there exist positive outliers on the higher end of the distribution, implying that there is a potential for higher share prices than the mean value. A kurtosis of 5.27 indicates leptokurtosis, which means that the distribution has fatter tails and a sharper peak compared to a normal distribution. This implies that the data has a higher likelihood of extreme values compared to a normal distribution.

Forecasts

Worksheet: [DCF McPhy Energy SA.xlsx]Inputs

Forecast: Fair Share Price **Cell: C36**

Summary:
Entire range is from 4.42 to 47.57
Base case is 13.49
After 100,000 trials, the std. error of the mean is 0.01



Statistics:	Forecast values
Trials	100,000
Base Case	13.49
Mean	14.10
Median	13.48
Mode	—
Standard Deviation	4.04
Variance	16.31
Skewness	1.07
Kurtosis	5.27
Coeff. of Variation	0.2864
Minimum	4.42
Maximum	47.57
Range Width	43.15
Mean Std. Error	0.01

Forecast: Fair Share Price (cont'd) **Cell: C36**

Percentiles:	Forecast values
0%	4.42
10%	9.58
20%	10.76
30%	11.71
40%	12.60
50%	13.48
60%	14.45
70%	15.59
80%	17.05
90%	19.37
100%	47.57

End of Forecasts

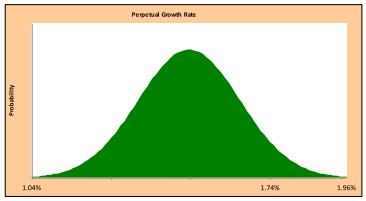
Assumptions

Worksheet: [DCF McPhy Energy SA.xlsx]Inputs

Assumption: Perpetual Growth Rate **Cell: C20**

Normal distribution with parameters:

Mean	1.50%
Std. Dev.	0.15%

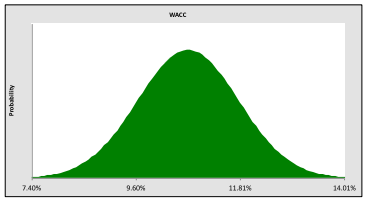


Assumption: WACC **Cell: C19**

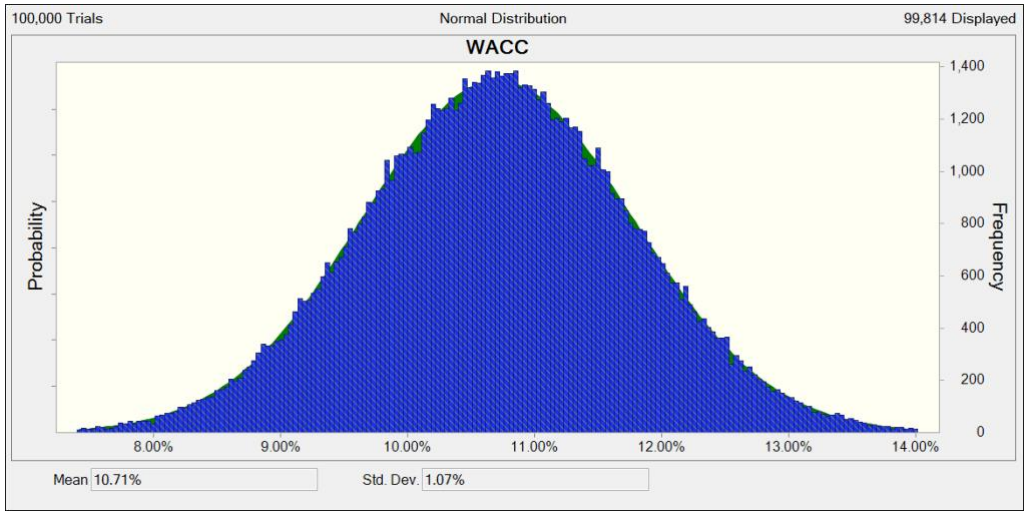
Normal distribution with parameters:

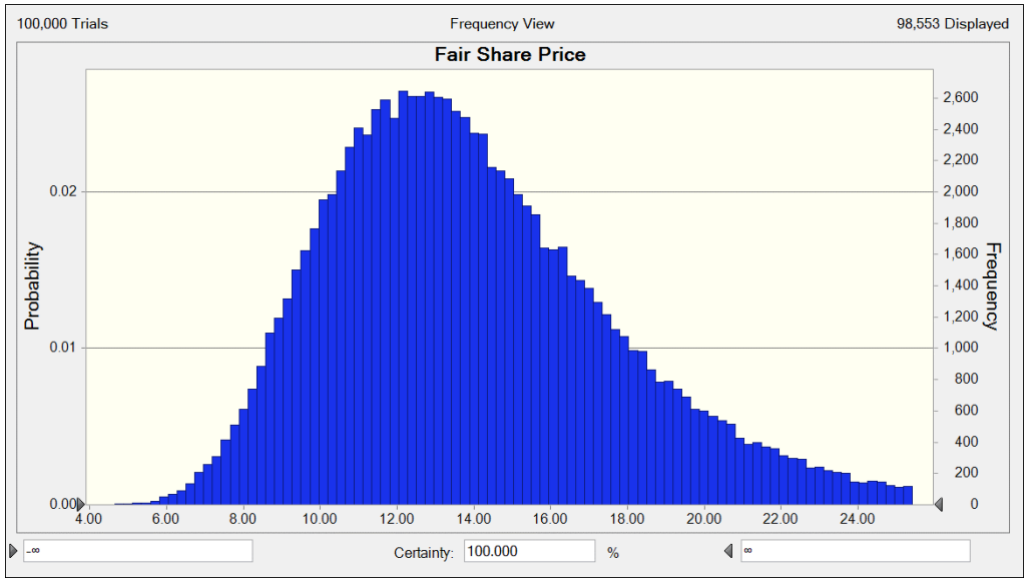
Mean	10.71%
Std. Dev.	1.07%

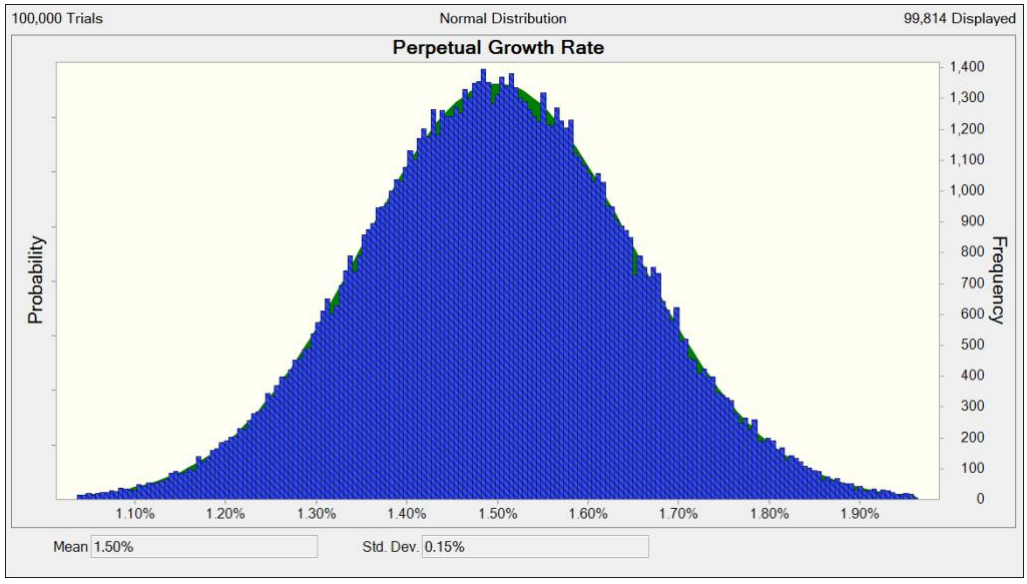
Assumption: WACC (cont'd) **Cell: C19**



End of Assumptions


100,000 Trials
Normal Distribution
99,814 Displayed
WACC
Probability
Frequency
1,400
1,200
1,000
800
600
400
200
0
8.00%
9.00%
10.00%
11.00%
12.00%
13.00%
14.00%
Mean 10.71%
Std. Dev. 1.07%


100,000 Trials
Frequency View
98,553 Displayed
Fair Share Price
Probability
Frequency
0.02
0.01
0.00
2,600
2,400
2,200
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
20.00
22.00
24.00
-∞
Certainty: 100.000 %
∞


100,000 Trials
Normal Distribution
99,814 Displayed
Perpetual Growth Rate
Probability
Frequency
1,400
1,300
1,200
1,100
1,000
900
800
700
600
500
400
300
200
100
0
1.10%
1.20%
1.30%
1.40%
1.50%
1.60%
1.70%
1.80%
1.90%
Mean 1.50%
Std. Dev. 0.15%

Sensitivity Analysis

Sensitivity Analysis

Sensitivity Analysis for Fair Share Price						
		Perpetual Growth Rate				
		1.1%	1.3%	1.5%	1.7%	1.9%
WACC	10.3%	14.70	14.83	14.96	15.10	15.24
	10.5%	13.97	**14.08**	**14.20**	**14.33**	14.46
	10.7%	13.28	**13.38**	**13.49**	**13.60**	13.72
	10.9%	12.63	**12.72**	**12.82**	**12.92**	13.03
	11.1%	12.01	12.10	12.19	12.28	12.38

Min	12.72
Max	14.33
Average	13.51

While the results of the valuation analysis are attractive for McPhy Energy, a sensitivity analysis was conducted to assess how the fair share price would change in case a different WACC or a different perpetual growth rate were used.
Specifically, the perpetual growth rate and the WACC were subject to variations of +/-2%.
The results of the analysis show that the maximum fair share price generated would be equal to €14.33 per share, which is the result of a combination between a 1.7% perpetual growth rate and a 10.5% WACC. Conversely, the minimum fair share price generated would be equal to €12.72, which is a combination of a 1.3% perpetual growth rate and a 10.9% WACC.

Sensitivity Analysis for Equity Value						
		Perpetual Growth Rate				
		1.1%	1.3%	1.5%	1.7%	1.9%
WACC	10.3%	411,039	414,549	418,219	422,059	426,082
	10.5%	390,538	**393,739**	**397,082**	**400,576**	404,233
	10.7%	371,212	**374,133**	**377,181**	**380,364**	383,692
	10.9%	352,977	**355,646**	**358,428**	**361,331**	364,363
	11.1%	335,759	338,199	340,741	343,392	346,157

Min	355,646
Max	400,576
Average	377,609

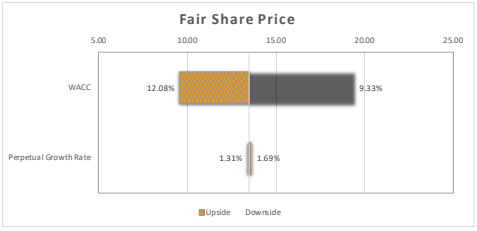
A sensitivity analysis was conducted also for the equity value to understand how it would vary in case the perpetual growth rate and the WACC were different.
The minimum equity value which would be obtained if the perpetual growth rate and the WACC were subject to a +/-2% variation is equal to €355,646 thousands. Instead, the maximum value would be €400,576 thousands.

The next sheet contains an alternative version to the sensitivity analysis performed via Excel. It was performed via the Oracle Crystal Ball package and gave rise to the following minimums, maximums, means and standard deviations (table on the right). It is a more comprehensive analysis of how the fair share price would change subject to variations in the WACC and the perpetual growth rate.

	Fair Share Price	Perpetual Growth Rate	WACC
Minimum	4.4	0.81%	5.89%
Mean	**14.12**	**1.50%**	**10.70%**
Maximum	56.18	2.17%	15.27%
Standard Deviation	4.07	0.15%	1.07%

Tornado Chart Analysis

Tornado Chart Analysis



Bar labels show the test range for each input variable

Save Chart Style | Reset Chart Style

	Fair Share Price				Input		
Input Variable	Downside	Upside	Range	Explained Variation[1]	Downside	Upside	Base Case
WACC	19.39	9.58	9.81	99.95%	9.33%	12.08%	10.71%
Perpetual Growth Rate	13.39	13.60	0.21	100.00%	1.31%	1.69%	1.50%

[1] Explained Variation is cumulative

Run options:

Tornado method	Percentiles of the variables
Test range	10% to 90%
Test points	5
Customize test ranges by variable	Off
Show top variables	20
Base case for Crystal Ball variables	Median values

Comments

A tornado analysis is a visual tool used to assess the impact of varying inputs on the outcome of interest. Input variables are displayed along the vertical axis, while the horizontal bars represent the range of values for each input variable. They show how much the output would change if the input variables changed within their range.

The tool used to perform the tornado analysis is the Oracle Crystal Ball package. Standard setting were used.

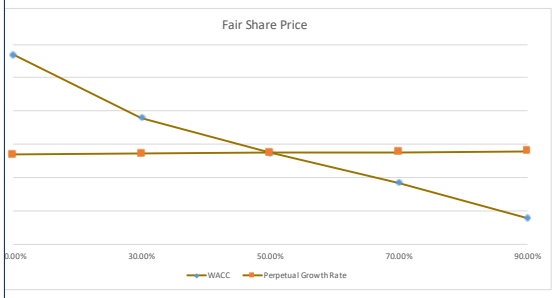
The range for WACC goes from 9.33% to 12.08%. An increase in WACC has a negative impact on the fair share price, which could reach a value of 9.58. Instead, a decrease in WACC has a positive impact on the fair share price, which could reach a value of 19.39.

The range for the perpetual growth rate goes from 1.31% to 1.69%. An increase in the perpetual growth rate has a positive impact on the fair share price, which could reach a value of 13.60. Instead, a decrease in the perpetual growth rate has a negative impact on the fair share price, which could reach a value of 13.39.

The length of the bars in the chart indicates the sensitivity of each input variable on the output. The longer the bar, the greater the impact of that variable on the output. In this case, the WACC plays a more important role than the perpetual growth rate in affecting the fair share price.

Spider Chart Analysis

Spider Chart Analysis



Save Chart Style | Reset Chart Style

		Fair Share Price				
Input Variable	Elasticity[1]	10.00%	30.00%	50.00%	70.00%	90.00%
WACC	-2.74	19.39	15.60	13.49	11.70	9.58
Perpetual Growth Rate	0.06	13.39	13.45	13.49	13.54	13.60

[1]Elasticity is averaged across the entire test range

Run options:

Tornado method	Percentiles of the variables
Test range	10% to 90%
Test points	5
Customize test ranges by variable	Off
Show top variables	20
Base case for Crystal Ball variables	Median values

Comments

The aim of this spider chart is to display the fair share price at different levels of the WACC and the perpetual growth rate. Each point on the chart represents a combination of values.

Elasticity refers to the responsiveness of the fair share price to changes in input variables. A value of -2.74 indicates that a 1% decrease in WACC would lead to a 2.74% increase in the fair share price, while a 1% increase in WACC would lead to a 2.74% decrease in the fair share price. An elasticity value of 0.06 suggests that a 1% increase in the perpetual growth rate would result in a 0.06% increase in the fair share price, while a 1% decrease in the perpetual growth rate would result in a 0.06% decrease in the fair share price.

This elasticity analysis is in line with what was found in the tornado analysis, in which WACC seemed to have a higher impact on the fair share price compared to the perpetual growth rate. Indeed, a higher absolute value of elasticity indicates a stronger impact on the outcome variable.

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